2019-06

Chasing the Climate Change Momentum: Linking DOD's Operational Energy Program Recommendations for the Department of Defense

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REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. REPORT DATE *(DD-MM-YYYY)*	2. REPORT TYPE	3. DATES COVERED *(From - To)*
19-05-2019	LLM Thesis	

4. TITLE AND SUBTITLE

Chasing the Climate Change Momentum: Linking DOD's Operational Energy Program
Recommendations for the Department of Defense

5a. CONTRACT NUMBER

5b. GRANT NUMBER

5c. PROGRAM ELEMENT NUMBER

6. AUTHOR(S)

Didawick, Holly, H, CDR, JAGC, USN

5d. PROJECT NUMBER

5e. TASK NUMBER

5f. WORK UNIT NUMBER

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)

8. PERFORMING ORGANIZATION REPORT NUMBER

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)

Civilian Institutions Office (Code 522)
Naval Postgraduate School
1 University Circle, Herrmann Hall Rm HE046
Monterey, CA 93943-5033

10. SPONSOR/MONITOR'S ACRONYM(S)

NPS CIVINS

11. SPONSORING/MONITORING AGENCY REPORT NUMBER

12. DISTRIBUTION AVAILABILITY STATEMENT

Approved for public release; distribution is unlimited

13. SUPPLEMENTARY NOTES

14. ABSTRACT

Fuel is the lifeblood of DoD operations and capability, without which, ships, planes, aircraft and weapons systems would cease to function. As a voracious oil consumer, protecting energy security, specifically operational energy, defined as the energy required for training, moving and sustaining military forces and weapons specifically for military operations, is critical. In 2009, Congress intervened with mandates directed at the DoD to create an executive level office of Operational Energy Policy and Programs. This program and the resulting two department strategies, in 2011 and 2016, ignited an energy conscious mindset across the Service branches and led to many energy innovations. During this time, the DoD also recognized the implications and growing national security threat from climate change. In both the 2010 and 2014 Quadrennial Defense Review, climate change and energy security were inextricably linked. But while climate change preparations, via adaptation and mitigation of infrastructure, have been persistent within the DoD, the momentum behind operational energy has stalled. This paper recommends the DoD fashion a more visible and concrete connection between energy security, climate change and national security. While politics and current administration rhetoric make this challenging, the DoD has successfully proved it can insulate itself from the noise in order to protect national security.

15. SUBJECT TERMS

operational energy, climate change, energy security,

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			19b. TELEPONE NUMBER (*Include area code*)
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Chasing the Climate Change Momentum: Linking DOD's Operational Energy Program Recommendations for the Department of Defense

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A Thesis submitted to

The Faculty of
The George Washington University Law School
in partial satisfaction of the requirements
for the degree of Master of Laws
May 19, 2019

Thesis directed by
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Acknowledgements

I would like to thank my husband, Josh Didawick, for his encouragement and support; my thesis advisor Associate Dean LeRoy Paddock, Visiting Associate Professor Eun Hee Han and Head Reference Librarian Germaine Leahy for their assistance and input throughout the writing process; and my parents, William and Mary Higgins. This thesis is dedicated to my daughter, Debra Grace Didawick.

Disclaimer

Commander Didawick serves in the U.S. Navy Judge Advocate General's Corps. This paper was submitted in partial satisfaction of the requirements for the degree of Master of Laws in Environment and Energy Law at The George Washington University Law School. The views expressed in this paper are solely those of the author and do not reflect the official policy or position of the United States Navy, Department of Defense or U.S. Government.

Abstract

Chasing the Climate Change Momentum: Linking DOD's Operational Energy Program Recommendations for the Department of Defense

Fuel is the lifeblood of U.S. Department of Defense (DOD) operations and capability, without which, ships, planes, aircraft and weapons systems would cease to function. As a voracious oil consumer, protecting energy security, specifically operational energy, defined as the energy required for training, moving and sustaining military forces and weapons specifically for military operations, is critical. In 2009, Congress intervened with mandates directed at the Defense Department to create an executive level office of Operational Energy Policy and Programs. This program and the resulting two department strategies, in 2011 and 2016, ignited an energy conscious mindset across the Service branches and led to many energy innovations. During this time, the DOD also recognized the implications and growing national security threat from climate change. In both the 2010 and 2014 Quadrennial Defense Review, climate change and energy security were inextricably linked. But while climate change preparations, via adaptation and mitigation of infrastructure, have been persistent within the DOD, the momentum behind operational energy has stalled. The focus has cooled as a result of a changed global energy landscape, a less supportive administration prioritizing fossil fuel interests over green renewables, and lagging institutional commitment. This paper recommends the DOD fashion a more visible and concrete connection between energy security, climate change and national security. While politics and current administration rhetoric make this challenging, the DOD has successfully proved it can insulate itself from the noise in order to protect national security.

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Introduction

It takes millions of barrels of oil to feed the machinery of war. In fiscal year 2017 alone, the Department of Defense (DOD) reported that it consumed over 85 million barrels of fuel to power ships, aircraft, combat vehicles and contingency bases at a cost of nearly $8.2 billion.[1] Without this critical resource, DOD operations would grind to a halt. For the Army, Navy, Air Force and Marines, fuel is the lifeblood that keeps planes in the air, convoys on the ground, ships at sea, and weapons systems functioning. And though it is a necessity, fuel is expensive, bulky, and slow to transport requiring special procedures and equipment for acquisition, shipment, storage and distribution.[2] In peacetime and at war, the United States has been and continues to be the world's largest consumer of oil.[3] Within the U.S. alone, the DOD accounts for most of the energy consumed by the federal government.[4] For decades, this dependency on foreign oil has had far-reaching national security implications impacting U.S. alliances, military basing, and foreign policy entanglements. Much of America's foreign and defense policies have been defined by decisions to place America's military in locations around the globe to ensure the unimpeded flow of oil. This paper will explore the concept of energy security through the lens of DOD[5], specifically operational energy, which accounts for

[1] Office of the Under Secretary of Defense for Acquisition and Sustainment, *Fiscal Year 2017 Operational Energy Annual Report* (2018).
[2] James P. Stucker, John F. Schank, Bonnie Dombey-Moore, *Assessment of DoD Fuel Standardization Policies,* RAND REPORT (1994).
[3] *What countries are the top producers and consumers of oil?,* U.S. Energy Information Administration, https://www.eia.gov/tools/faqs/faq.php?id=709&t=6 (last updated Dec. 3, 2018).
[4] *U.S. federal government energy costs at lowest point since 2004,* U.S. Energy Information Administration, Oct. 2, 2017, https://www.eia.gov/todayinenergy/detail.php?id=33152.
[5] Id. (For purposes of policy, energy usage within the DOD is divided into two areas: installation (or facility) energy and operational (or mobility) energy. Installation energy is the energy required to run and operate military installations, comprising nearly 300,000 buildings, accounting for 30 percent of DOD's total energy use.)

approximately 70 percent of total DOD energy use.[6] Operational energy (hereinafter OE) is the energy required for training, moving and sustaining military forces and weapons specifically for military operations.[7] The U.S. has been engaged in overseas contingency operations in Iraq and Afghanistan for the last eighteen years, and continues to support missions in Djibouti, Africa and (for now) Syria. The impacts involved, both in terms of transportation and lives, of getting fuel to these forces on the frontlines are complicated and costly.

Closely tied to this broader discussion of energy security is climate change. The DOD and national security agencies of the federal government have repeatedly recognized climate change as a national security threat.[8] In 2010 the DOD's Quadrennial Defense Review declared that climate change and energy security were inextricably linked and would play significant roles in the future security environment.[9] This inter-relationship is complicated however, by the current U.S. administration's position on climate change, with President Trump being a well-known skeptic. Yet despite his Administration's efforts to roll back environmental laws designed to curb greenhouse gases (a known contributor and accelerant of global warming[10]), the DOD has long recognized and accounted for climate change impacts in its overall policy and planning.

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[6] Rebecca George, *Defense Department energy use falls to lowest level since at least 1975,* U.S. Energy Information Administration, Feb. 5, 2015, https://www.eia.gov/todayinenergy/detail.php?id=19871.
[7] Assistant Secretary of Defense for Energy, Installations and Environment, DEPARTMENT OF DEFENSE ANNUAL ENERGY MANAGEMENT AND RESILIENCE REPORT (AMERR) FY2017 (2018).
[8] Michelle Melton, *Climate Change and National Security, Part I: What is the Threat, When's It Coming, and How Bad Will it Be?* LAWFARE Blog, Nov. 19, 2018, https://www.lawfareblog.com/climate-change-and-national-security-part-i-what-threat-whens-it-coming-and-how-bad-will-it-be
[9] DEP'T OF DEF., QUADRENNIAL DEFENSE REVIEW (2010). http://archive.defense.gov/qdr/QDR%20as%20of%2029JAN10%201600.pdf.
[10] FOURTH NATIONAL CLIMATE ASSESSMENT, VOLUME II IMPACTS, *Risks and Adaptation in the United States*, U.S. GLOBAL CHANGE RESEARCH PROGRAM (2018).

While DOD and Congressional attention are focused on mitigating climate change impacts, the momentum behind operational energy efforts has stalled in recent years. After just a decade in practice, the program has been negatively impacted by a lack of coordinated executive leadership, a cultural aversion to "green" efficiency, and recent competition for resources by larger DOD readiness priorities. Other factors contributing to this stalled momentum include the drawdown in military forces overseas and the decreasing price of oil, which have led some to question the need for continued commitment to energy efficiency goals, particularly those critics who view energy conservation as too costly and a detractor from capability.

Though OE has slipped from the Department's list of priorities, it should remain there given DOD's increasing aggregate demand for fuel (Navy and Air Force specifically), fuel intensity, and its growing expeditionary asset consumption.[11] Moreover, the number of projects already invested in energy efficiency and the fact that global supplies and availability of oil are always precarious are reason enough to keep OE high on stakeholders' agendas. There are steps that DOD can take to keep OE relevant and on track to meeting the goals outlined in the Department's strategies, assuming the political will is there. This paper recommends the OE program and future strategy (anticipated in 2021 per Congressional mandate) should more closely align itself with climate change. In this way, the program can harness the momentum and attention surrounding that issue while supporting the natural fit with energy security.

Roadmap

Up until 2008, the military had focused its efforts against globalized threats and fighting wars with some awareness but no real action toward addressing the systemic

[11] Interview with James Caley, Director for Operational Energy, Department of the Navy (Mar. 22, 2019).

problems that energy security played. But it became clear that ignoring the energy issue left the military highly vulnerable and was no longer a prudent course of action.[12] The issue of fuel, particularly the cost and availability of petroleum-based fuels, significantly impacts DOD in all respects—military budgets, combat mission execution, institutional capabilities, and by implication, U.S. national security.[13] This paper will review DOD's energy security evolution, particularly focusing on the last decade when the OE strategies have been in effect. Section one will define energy security and OE through the lens of DOD's mission—protecting national security, and examine the operational and strategic implications of OE generally. Section two will review the history of DOD efforts to recognize and address energy security by looking at studies and the Congressional mandates to implement energy efficiency into its business practices. Section three will introduce the two Operational Energy strategies published in 2011 and 2016. Section four will examine the Department's overall progress toward achieving that balance of mission-oriented policy and energy conscious goals in line with the OE strategies. Section five will introduce the DOD's climate change adaptation roadmap, introduced in 2014, and examine the nexus of issues related to climate change, energy security and national security. Section six will then focus on the Trump Administration's actions and views related to energy policy and climate change broadly, and how these policies could impact DOD's future progress in implementing its strategy, offering recommendations for the way forward. Section seven will review the main points of the paper in perspective and provide concluding remarks.

[12] Jerry Warner and Peter W. Singer, FUELING THE BALANCE: A DEFENSE ENERGY STRATEGY PRIMER, Foreign Policy Paper Series, Aug. 25, 2009.
[13] Id.

Section 1: Energy Security and OE through the Lens of the DOD mission

The DOD's enduring mission is to provide combat-credible military forces needed to deter war and protect the security of the nation.[14] Should deterrence fail, the Joint Force must be prepared to fight and win. This means taking the fight anywhere, at anytime. This agile and adaptable force is necessary not only for national security, but also to respond to humanitarian assistance and disaster relief efforts around the globe. To do any of these missions, the DOD must be confident in its energy security. Defined by law, energy security means "having assured access to reliable supplies of energy and the ability to protect and deliver sufficient energy to meet mission essential requirements."[15] Thus, energy is the fundamental enabler of military capability, without which, there is virtually no capability.[16]

The term operational energy is also defined by statute as the "energy required for training, moving, and sustaining military forces and weapons platforms for military operations," and includes energy used by ships, aircraft, combat vehicles, and tactical power generators.[17] For the military commander at sea, a steady supply of energy (i.e. petroleum or biofuel blend) can extend deployment periods and reduce the number of dangerous replenishment operations. For the Air Force, operational energy means aviation fuel efficiency and navigating the complex logistical and technical challenges to getting fuel to the warfighter. For the military commander on the ground, energy is

[14] DEP'T OF DEF., NATIONAL DEFENSE STRATEGY (2018).
[15] 10 U.S.C. § 101(e)(7) (2018).
[16] DEP'T OF DEF., OPERATIONAL ENERGY ANNUAL REPORT TO CONGRESS (2018).
[17] 10 U.S.C. § 2926 (2018).

tactically relevant.[18] It fuels combat operations, powers forward operating bases (FOBs), and requires manpower to protect and deliver this liquid lifeline.

Petroleum-based liquid fuels are DOD's largest source of energy, accounting for approximately two thirds of its energy consumption.[19] When fuel use is divided by service, the Air Force is the largest user; when divided by platform type, aircraft are the largest user.[20] Thus, more than 90 percent of today's operational energy goes to fueling platforms, aircraft, ships and land vehicles.[21] More than 75 percent of total operational energy is consumed by aircraft alone.[22]

A. Operational Energy: Operational and Strategic Implications

Energy has significant operational, strategic, and budgetary implications. Operational challenges and risks relate to the diversion of resources away from combat to protect and move fuel to the battlefield, as well as the vulnerability of fuel supply lines to disruption.[23] Apart from food, fuel is the largest operational sustainment demand at the organizational level of war.[24] The other significant consumer of fuel and energy in the battlespace is at FOBs in the form of electric generators.[25] Often resembling a small college campus, FOBs are staging grounds in overseas locations for direct military

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[18] *Department of Defense Report to Congress on Energy Security Initiatives,* DOD ENERGY SECURITY TASK FORCE (2008).
[19] *See* DEP'T OF DEF., OPERATIONAL ENERGY STRATEGY (2011) (Military deployments generally rely on petroleum-based fuels. In current operations in Afghanistan and Iraq, jet fuel (JP-8 or JP-5 on ships) is the most prevalent battlefield fuel.)
[20] MOSHE SCHWARTZ, KATHERINE BLAKELEY, RONALD O'ROURKE, CONG. RESEARCH SERV., R42558, DEPARTMENT OF DEFENSE ENERGY INITIATIVES: BACKGROUND AND ISSUES FOR CONGRESS (2012).
[21] Id.
[22] *See* MILITARY ADVISORY BD., CTR. FOR NAVAL ANALYSES, ADVANCED ENERGY AND U.S. NATIONAL SECURITY, (2017), https://www.cna.org/CNA_files/PDF/IRM-2017-U-015512.pdf.
[23] MOSHE SCHWARTZ, KATHERINE BLAKELEY, RONALD O'ROURKE, CONG. RESEARCH SERV., R42558, DEPARTMENT OF DEFENSE ENERGY INITIATIVES: BACKGROUND AND ISSUES FOR CONGRESS, (2012).
[24] Greg Douquet, *Unleash Us From the Tether of Fuel – Innovation in energy can be a force multiplier on the battlefield,* ATLANTIC COUNCIL, Jan. 11, 2017.
[25] *See* MILITARY ADVISORY BD., CTR. FOR NAVAL ANALYSES, POWERING AMERICA'S DEFENSE: ENERGY AND THE RISKS TO NATIONAL SECURITY (2009), https://www.cna.org/cna_files/pdf/MAB_2-FINAL.pdf.

engagement. They contain everything from communications infrastructure and living quarters to administrative areas, eating facilities and industrial activities necessary to maintain combat systems.[26] All of these facilities require electricity, provided primarily by towed-in generators.[27] The fuel used by these generators comes from the same vulnerable supply chain that provides liquid fuel.[28] Fuel also comes with a host of hidden costs in terms of storage, security and building materials. In Afghanistan, U.S. forces not only paid for the infrastructure to keep and store fuel, but also enlarged the bases' perimeter in order to do so.[29] Yet again this meant diverting combat forces to protect the increased base footprint, at the expense of using those forces to directly engage the enemy.[30]

Though operational energy issues impact all branches of the DOD, it was the impacts felt by the Army and Marine Corps ground units in Iraq and Afghanistan at the height of the war that led to change. When asked at a Brookings Institution meeting in 2007 about what was the most important area of research that was needed to aid his men and women, Marine General James Mattis responded, "Unleash us from the tether of fuel."[31] No other quote comes close to encapsulating the frustration felt by the dozens of military commanders that served and led troops in those deployed environments at that time. From their perspective, reducing fuel demand could remove convoys from the battlespace, reduce operational vulnerability, and free up combat forces for other

[26] *See* MILITARY ADVISORY BD., CTR. FOR NAVAL ANALYSES, POWERING AMERICA'S DEFENSE: ENERGY AND THE RISKS TO NATIONAL SECURITY (2009), https://www.cna.org/cna_files/pdf/MAB_2-FINAL.pdf.
[27] Id.
[28] Id.
[29] Id.
[30] Greg Douquet, *Unleash Us From the Tether of Fuel – Innovation in energy can be a force multiplier on the battlefield,* ATLANTIC COUNCIL, Jan. 11, 2017.
[31] Jerry Warner and Peter W. Singer, FUELING THE BALANCE: A DEFENSE ENERGY STRATEGY PRIMER, Foreign Policy Paper Series, Aug. 25, 2009.

missions. This combat efficiency would then translate into greater endurance, lives saved, and actually extend the battlespace by enabling forces to travel longer distances and remain concealed longer without refueling.[32]

The strategic implications of DOD's fuel consumption concern the logistics of getting fuel to the overseas operating areas and ensuring the global free flow of oil.[33] It is this latter concern that drives U.S. national security policy as nations around the world increasingly compete for the same energy resources. In 2008, the Defense Science Board[34] (DSB) reported that the U.S. imported 60 percent of its oil from foreign sources and that the percentage was increasing. The report highlighted several problems associated with this dependence, namely that the U.S. felt forced to placate those oil-rich countries to maintain friendly relations for the purposes of this quid pro quo. Unfortunately, much of the global petroleum reserves at that time were in countries that were either not friendly to the U.S. or held contrary political values.[35] At worse, some of the countries that the U.S. maintained friendly relationships with were known to support extremist groups.[36] To say that U.S. oil dependence complicates foreign policy is an understatement. The DSB concluded that in effect, through its imports of oil the U.S. funded both sides of the global war on terror.[37] Thus, as long as U.S. forces rely on large

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[32] *Department of Defense Report to Congress on Energy Security Initiatives,* DOD ENERGY SECURITY TASK FORCE (2008).
[33] MOSHE SCHWARTZ, KATHERINE BLAKELEY, RONALD O'ROURKE, CONG. RESEARCH SERV., R42558, DEPARTMENT OF DEFENSE ENERGY INITIATIVES: BACKGROUND AND ISSUES FOR CONGRESS (2012).
[34] *History of the Defense Science Board*, https://www.acq.osd.mil/dsb/history.htm (last visited Feb. 2, 2019). Established in 1956, the DSB serves as the Federal Advisory Committee chartered to provide DOD leadership with "independent advice and recommendations on science, technology, manufacturing, acquisition processes, and other matters of special interest to the DoD."
[35] *More Fight, Less Fuel*, REPORT OF THE DEFENSE SCIENCE BOARD TASK FORCE ON DOD ENERGY STRATEGY (2008) http://www.acq.osd.mil/dsb/reports/2008-02-ESTF.pdf.
[36] Id.
[37] Id.

volumes of energy, particularly petroleum-based fuels, the vulnerability and volatility of global supply will continue to raise risks and costs for the armed forces.[38]

B. Budgetary Implications

Energy security has significant implications for DOD's budget. From the Departmental force planning perspective, greater fuel efficiency reduces direct operating costs and mitigates the budget effects caused by price volatility.[39] The problem arises when the cost of fuel greatly exceeds what is called the stabilized rate.[40] The rates will adjust to reflect the change, but the Services will often have insufficient operation and maintenance funds to perform other functions that are normally paid from that budget.[41] This could impact maintenance, training activities and overall readiness, if Congress does not intervene to provide supplemental funds.[42] For example, in fiscal years (FY) 2006 and 2007, DOD's total energy costs exceeded $13 billion, necessitating an additional request from Congress for $5 billion in FY 2008 obligational authority[43] to ensure it could support the increased fuel costs.[44] In 2008, the total annual energy bill for the DOD was approximately $20 billion, three-quarters of which was petroleum fuels for

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[38] DEP'T OF DEF., OPERATIONAL ENERGY STRATEGY (2011).
[39] *Department of Defense Report to Congress on Energy Security Initiatives,* DOD ENERGY SECURITY TASK FORCE (Oct 2008).
[40] This stabilized rate policy serves to protect customers from unforeseen inflationary increases and other cost uncertainties and better assures customers that they will not have to reduce programs to pay for potentially higher-than-anticipated prices. *See* DOD FINANCIAL MANAGEMENT REGULATION, Vol 2B, Ch.9, June 2004, 9-12.
[41] *More Capable Warfighting Through Reduced Fuel Burden,* REPORT OF THE DEFENSE SCIENCE BOARD, May 2001.
[42] Id.
[43] Congress finances federal programs and activities by providing "budget authority," which grants agencies authority to enter into financial obligations that will result in immediate or future outlays of government funds. From an appropriations law perspective, whether funds, received by an agency, are available for obligation without further congressional action is the key question. *See* U.S. GOV'T ACCOUNTABILITY OFFICE, GAO-16-464SP, PRINCIPLES OF FEDERAL APPROPRIATIONS LAW, CHAPTER 2, THE LEGAL FRAMEWORK (2016).
[44] *Department of Defense Report to Congress on Energy Security Initiatives,* DOD ENERGY SECURITY TASK FORCE (2008).

operational energy.[45] The DOD estimated that for every $10 increase in the price of a barrel of oil, DOD's operating costs increased by approximately $1.3 billion.[46]

Even now, as a purchaser of fuel on the open market, the DOD is subject to the same price volatility experienced by commercial customers making it difficult to anticipate and budget for fuel costs.[47] Moreover, the DOD's demand for operational energy varies according to the missions assigned and the equipment necessary to execute those missions, which often come about unexpectedly (i.e. post-9/11 operations, humanitarian relief missions) or involve changes in the magnitude of ongoing operations.[48] Future financial challenges and risks will continue to be the increasing costs for fuel, the shorter-term volatility in fuel prices and trying to avoid creating large unfunded obligations.[49]

Section 2: Evolution of DOD Energy Conscience

To understand the present, it is critically important to reflect on the past. In order to appreciate the DOD's evolution toward energy consciousness and conservation, there were several pivotal studies that occurred at an early stage that were critical to the later development of the first OE strategy.[50] In what appears to be one of the earliest attempts to examine the DOD's fuel efficiency, in 1999, the Under Secretary of Defense for

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[45] *Department of Defense Report to Congress on Energy Security Initiatives,* DOD ENERGY SECURITY TASK FORCE (2008).
[46] WILLIAM M. SOLIS, U.S. GOV'T ACCOUNTABILITY OFFICE, GAO-08-523T, DEFENSE MANAGEMENT: OVERARCHING ORGANIZATION FRAMEWORK NEEDED TO GUIDE AND OVERSEE ENERGY REDUCTION EFFORTS FOR MILITARY OPERATIONS (2008).
[47] Office of the Under Secretary of Defense for Acquisition and Sustainment, *Fiscal Year 2017 Operational Energy Annual Report* (2018).
[48] *Energy Security and Research, Before the Subcommittee on Defense Senate Appropriations Committee,* 113th Cong. (2014)(statement of Tom Morehouse, Acting Assistant Secretary of Defense for Operational Energy Plans and Programs.
[49] MOSHE SCHWARTZ, KATHERINE BLAKELEY, RONALD O'ROURKE, CONG. RESEARCH SERV., R42558, DEPARTMENT OF DEFENSE ENERGY INITIATIVES: BACKGROUND AND ISSUES FOR CONGRESS (2012).
[50] Richard J. Kendig, Ashley D. Seaton, Robert J. Rodgers, EVOLUTION OF THE OPERATIONAL ENERGY STRATEGY AND ITS CONSIDERATION IN THE DEFENSE ACQUISITION PROCESS (Sept. 2016)(unpublished MA joint thesis, Naval Postgraduate School).

Acquisition, Technology and Logistics, requested that the Defense Science Board form a task force on improving fuel efficiency of weapons platforms.[51] Fuel is typically the largest single logistic resource by volume required for combat operations.[52] At that time, just ten years after the Cold War, over 70 percent of the tonnage required to position the U.S. Army into battle was fuel.[53] Likewise, the Air Force, "the largest DOD consumer, spent approximately 85 percent of its fuel budget to deliver, by airborne tankers, just six percent of its annual jet fuel usage."[54] Considering this large and costly fuel usage, the DSB mused that it would seem only logical for the DOD to instinctively strive for continuous improvement in fuel efficiency, but at that time there was no evidence that this was a priority, or even a goal.[55]

A. 2001 DSB Report

The Task Force was asked to identify technologies that improved fuel efficiency for the full range of weapons platforms (land, sea and air) and assess their operational, logistics, cost, and environmental impacts for a range of practical implementation scenarios.[56] The report revealed DOD's high demand for operational energy and shined a spotlight on institutional barriers, implementation issues, and a flawed acquisitions process with respect to fuel efficiency.[57] For example, the report found that DOD based its price for fuel only on the wholesale refinery price, and did not include the delivery cost to the consumer (i.e. the long logistics tail to get that fuel to a tank, ship or aircraft),

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[51] *More Capable Warfighting Through Reduced Fuel Burden,* REPORT OF THE DEFENSE SCIENCE BOARD, May 2001.
[52] James P. Stucker, John F. Schank, Bonnie Dombey-Moore, *Assessment of DoD Fuel Standardization Policies,* RAND REPORT (1994).
[53] *More Capable Warfighting Through Reduced Fuel Burden,* REPORT OF THE DEFENSE SCIENCE BOARD, May 2001.
[54] Id.
[55] Id.
[56] Id.
[57] Id.

which is significantly higher.[58] Without understanding or factoring in the *true costs* of fuel delivery and its supporting infrastructure (including equipment, people, facilities and other overhead costs), there was no way to incentivize leaders to adopt energy efficient practices.[59] Moreover, the report lamented the complete lack of interest in fuel and energy efficiency by the DOD other than to meet federal executive orders or legislative mandates.[60]

The final report was forwarded to senior DOD leadership in May 2001. The Task Force recommended several actions for DOD to adopt in order to develop the analytical tools necessary to quantify its warfighting, logistics, and costs related to its weapons platforms and acquisition processes:

(1) Base investment decisions on the true cost of delivered fuel and on warfighting and environmental benefits;
(2) Strengthen the linkage between warfighting capability and fuel logistics requirements through wargaming and new analytical tools;
(3) Provide leadership that incentivizes fuel efficiency throughout the DOD;
(4) Specifically target fuel efficiency improvements through investments in science and technology and system designs; and
(5) Explicitly include fuel efficiency in requirements and acquisition processes.[61]

Remarkably, given the early timeframe, the task force also investigated the environmental impacts of fossil fuel use, including global climate change. It presciently observed that climate change was an emerging issue that would take on increased importance over the coming years and decades, adding that international scientific evidence added credence to the concern each year.[62] Specifically, the Task Force

[58] Id.
[59] Id.
[60] Id.
[61] Id.
[62] *More Capable Warfighting Through Reduced Fuel Burden,* REPORT OF THE DEFENSE SCIENCE BOARD, May 2001.

encouraged DOD to factor in the environmental benefits of reduced fuel consumption and greenhouse gas emissions into its decisions on investment in fuel efficiency technology.[63]

B. Inaction by DOD

The report, while revelatory, was a victim of poor timing in that its recommendations were largely ignored once the DOD's focus shifted to war efforts in the aftermath of the terrorist attacks of September 11, 2001. It took five additional years before DOD reviewed its energy problem once more by commissioning two separate studies to assess ways to reduce DOD's dependence on fossil fuels and also to establish an energy strategy.[64] The studies were reviewed and set aside. Additionally, in 2006, the Office of the Secretary of Defense (OSD) created a department-wide Energy Security Task Force for the purpose of monitoring progress of select energy related research and development projects.[65] The Task Force was supposed to define an actionable investment roadmap for lowering DOD's fossil fuel requirements and developing alternate fuels.[66] It is unclear what progress, if any, was made by the Task Force. Perhaps the one bright spot during this time period was a policy memorandum announcing the "Fully Burdened Cost of Fuel Pilot Program,"[67] issued in 2007. Led by the Office of the Under Secretary of Defense for Acquisition, Technology and Logistics,

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[63] Id.

[64] The JASONs, *Reducing DOD Fossil-Fuel Dependence,* JSR-06-135 (Sept 2006) and LMI, *Transforming the Way DOD Looks at Energy: An Approach to Establishing an Energy Strategy,* Report FT602T1 (Apr. 2007).

[65] WILLIAM M. SOLIS, U.S. GOV'T ACCOUNTABILITY OFFICE, GAO-08-523T, DEFENSE MANAGEMENT: OVERARCHING ORGANIZATION FRAMEWORK NEEDED TO GUIDE AND OVERSEE ENERGY REDUCTION EFFORTS FOR MILITARY OPERATIONS (2008).

[66] *Department of Defense Report to Congress on Energy Security Initiatives,* DOD ENERGY SECURITY TASK FORCE (2008).

[67] This was in response to Executive Order 13423, issued in 2007, by President Bush called *Strengthening Federal Environmental, Energy, and Transportation Management,* a mandate addressing the government's energy consumption. The EO instructed federal agencies to conduct their environmental, transportation and energy-related activities in an environmentally, economically and fiscally sound way. While its application to the DOD was limited to non-tactical vehicles and installations, it did spur DOD to create its "Fully Burdened Cost of Fuel Pilot Program."

the memorandum declared DOD policy was to factor in the fully burdened cost of delivered energy with respect to all its "tactical systems with end items that create a demand for energy and to improve the energy efficiency of those systems."[68] However, this too was largely ignored.[69]

While the DOD talked a good game, its lack of action on these supposed priorities and policy pronouncements spoke louder. When no further progress ensued, these steps amounted to little more than gestures. This sluggish attention to energy issues and growing fuel consumption led to a growing chorus of pleas from experts and senior military leaders to address the problem. After many years of an expensive war effort in Iraq and Afghanistan, Congress too, grew frustrated that war planning with respect to energy dependence and security was neither understood nor acted upon. To complicate matters, the initiatives to increase energy efficiency were at times stymied by critics who were dismissive of the issue, framing it more as an environmental concern rather than a national security issue.[70] However, the reality on the ground and hard data made the problem hard to ignore.

C. Data Reveals Undervalued Costs

In 2006, the DOD spent over $10 billion on fuel for combat and combat-related systems.[71] While that price is staggering in scale, the price of fuel alone did not reveal the scale of the problem or the true cost. What became clear was that an undervalued

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[68] Richard J. Kendig, Ashley D. Seaton, Robert J. Rodgers, EVOLUTION OF THE OPERATIONAL ENERGY STRATEGY AND ITS CONSIDERATION IN THE DEFENSE ACQUISITION PROCESS (Sept. 2016)(unpublished MA joint thesis, Naval Postgraduate School).

[69] *More Fight, Less Fuel*, REPORT OF THE DEFENSE SCIENCE BOARD TASK FORCE ON DOD ENERGY STRATEGY (2008) http://www.acq.osd.mil/dsb/reports/2008-02-ESTF.pdf.

[70] Jerry Warner and Peter W. Singer, FUELING THE BALANCE: A DEFENSE ENERGY STRATEGY PRIMER, Foreign Policy Paper Series, Aug. 25, 2009.

[71] *More Fight, Less Fuel*, REPORT OF THE DEFENSE SCIENCE BOARD TASK FORCE ON DOD ENERGY STRATEGY (2008) http://www.acq.osd.mil/dsb/reports/2008-02-ESTF.pdf.

cost related to fuel delivery was the protection required to assure delivery to the point of use.[72] These costs were difficult to measure and were often not monetary at all, such as degraded combat effectiveness, casualty losses and risk to mission.[73] For instance, reduced combat effectiveness meant forces were tasked to protect supply lines rather than actively contribute to combat capability.[74] In November 2007, approximately 80 convoys carrying fuel and water traveled continuously between Kuwait and Iraq destinations, all of which were protected by uniformed forces.[75] In June 2008, 44 trucks delivering 220,000 gallons of fuel to Bagram Air Field in Afghanistan were lost due to attacks and other events.[76] Troop losses from logistics convoys became so serious that Marine Corps Major General Richard Zilmer sent the Pentagon an unprecedented "Priority 1" request asking for renewable energy backup.[77] This unusual request put fuel convoy issues on the national security agenda for the first time.

As these problems reached a fever pitch, the DOD reached out once more to the Defense Science Board. It was asked to identify opportunities to reduce fuel demand by deployed forces and assess the effects on cost, operations and force structure, and identify any institutional barriers to achieving the recommendations of the prior Task Force.[78] The final report, published in 2008, not surprisingly concluded that the DOD faced an unnecessarily high, and growing battlespace fuel demand, which compromised

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[72] Id.
[73] Id.
[74] Id.
[75] Id.
[76] Katherine McIntire Peters, *GAO: Pentagon needs to better manage battlefield fuel consumption,* GOVERNMENT EXECUTIVE, Mar. 4, 2009.
[77] Mark Clayton, *In the Iraqi War Zone, U.S. Army Calls for 'Green' Power*, THE CHRISTIAN SCIENCE MONITOR, Dec. 7, 2006, http://www.csmonitor.com/2006/0907/p01s04-usmi.html.
[78] *More Fight, Less Fuel*, REPORT OF THE DEFENSE SCIENCE BOARD TASK FORCE ON DOD ENERGY STRATEGY (2008) http://www.acq.osd.mil/dsb/reports/2008-02-ESTF.pdf.

operational capability and jeopardized mission success.[79] Specifically, the high fuel demand (a) required an excessive support force structure at the expense of operational forces; (b) created more risk for support operations than necessary; and (c) increased life-cycle operations and support costs.[80] The report issued six findings, only three of which are relevant to the discussion of operational energy issues (vice installation-specific).

Finding 1 expressed the frustration that the recommendations from the 2001 DSB report had not been implemented but were still valid and necessary.[81] Thus, the DOD needed to re-engineer its business practices to incorporate energy as a factor in all its Departmental decisions and adopt a fully burdened cost of fuel methodology to better inform its acquisition investment decisions.[82] Finding 2 concluded that the DOD lacked the "strategy, policies, metrics, information, and governance structure necessary to properly manage its energy risks."[83] With no leadership or unifying vision, there were few efforts to manage energy demand by operational forces and any decisions made were scattered throughout the organization with little accountability or oversight.[84] The Task Force had concluded that lack of leadership was a root cause of DOD's energy problems.[85] Lastly, finding 3 determined that operational risks from fuel disruption required demand-side remedies, meaning reduction in operational fuel demand was the single best means to reduce this operational risk.[86] However, it noted that the DOD was

[79] Id.
[80] Id.
[81] Id.
[82] Richard J. Kendig, Ashley D. Seaton, Robert J. Rodgers, EVOLUTION OF THE OPERATIONAL ENERGY STRATEGY AND ITS CONSIDERATION IN THE DEFENSE ACQUISITION PROCESS (Sept. 2016)(unpublished MA joint thesis, Naval Postgraduate School).
[83] *More Fight, Less Fuel*, REPORT OF THE DEFENSE SCIENCE BOARD TASK FORCE ON DOD ENERGY STRATEGY (2008) http://www.acq.osd.mil/dsb/reports/2008-02-ESTF.pdf.
[84] Id.
[85] Id.
[86] Id.

not then equipped to make informed decisions on the most effective way forward. Given these findings, the recommendations encouraged DOD to do the following:

- Accelerate its efforts to implement energy efficiency Key Performance Parameters (KPPs) and use the Fully Burdened Cost of Fuel (FBCF) in its acquisition decisions as previously recommended by the 2001 Task Force;
- Develop a DOD strategic plan establishing measurable goals with clear responsibility and accountability. This comprehensive energy plan should address both fixed installations and operational forces;
- Invest in energy efficient and alternative energy technologies to a level commensurate with their operational and financial value; and
- Identify and exploit near-term opportunities to reduce energy use through policies and incentives that change operational procedures.[87]

D. GAO and Congress Intervene

The 2008 DSB report was not the only voice arguing for change at the DOD. At the request of the House Armed Services subcommittee on Readiness, the GAO was asked to identify key efforts underway at DOD to reduce its mobility energy demand (AKA operational energy) and assess the extent to which DOD established an organizational framework to guide and oversee those efforts.[88] As with all previous studies, the GAO concluded that DOD faced rapidly increasing fuel costs and high fuel requirements that placed a significant logistics burden on its forces.[89] Given projected increases in the worldwide demand for oil and uncertainties about world oil supplies, the GAO recommended sustained top leadership attention to long-term energy issues and solutions.[90] In response to the GAO report, the DOD partially concurred with its findings

[87] Id.
[88] WILLIAM M. SOLIS, U.S. GOV'T ACCOUNTABILITY OFFICE, GAO-08-523T, DEFENSE MANAGEMENT: OVERARCHING ORGANIZATION FRAMEWORK NEEDED TO GUIDE AND OVERSEE ENERGY REDUCTION EFFORTS FOR MILITARY OPERATIONS (2008).
[89] Id.
[90] Id.

and recommendations but ultimately concluded that its current structure and Department Directives were more than adequate to guide its oversight and policymaking efforts.[91]

At this point, the issue was not that DOD was unaware of the problem, or how serious it was. It was soliciting information, but taking too long to produce results and resistant to creating an Executive level position. Finally, under mounting evidence and calls for reform, Congress got involved in 2008. In a House Report to accompany the 2008 DOD Appropriations Bill, Congress requested the Defense Energy Security Task Force submit a semi-annual report on the initiatives and activities that the DOD was taking to promote energy savings and energy efficiency across the Department.[92] The Committee commended DOD for creation of the Task Force, but expressed concern "with the overall lack of support within the DOD to establish aggressive goals and timelines to achieve increased energy efficiency."[93] In response, the DOD submitted a 21-page report outlining its energy security initiatives. It recognized energy as a limiting factor to its operations and laid out an initial strategic plan focusing on fuel optimization for mobility platforms and other operational efficiencies.[94] It also highlighted initiatives by each Service in pursuit of these goals. The DOD assured Congress that it had a "balanced portfolio of energy efforts in place, either in testing or in the planning stages."[95]

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[91] DOD response letter to GAO Report GAO-08-523T, DEFENSE MANAGEMENT: OVERARCHING ORGANIZATION FRAMEWORK NEEDED TO GUIDE AND OVERSEE ENERGY REDUCTION EFFORTS FOR MILITARY OPERATIONS (2008).
[92] *Department of Defense Report to Congress on Energy Security Initiatives,* DOD ENERGY SECURITY TASK FORCE (2008).
[93] H.R. REP. NO. 110-279 (2008).
[94] *Department of Defense Report to Congress on Energy Security Initiatives,* DOD ENERGY SECURITY TASK FORCE (2008).
[95] Id.

Despite its assurances, and perhaps leery of past inaction, Congress added several mandates to the annual National Defense Authorization Act (NDAA) for FY 2009, all with the express purpose of improving the way DOD managed its operational energy. For starters, despite the push back from the DOD about creating a separate executive-level position, Congress specifically established a new position titled "Director of Operational Energy Plans and Programs."[96] The post, appointed by the President, was responsible for consolidated oversight within the Department for energy related issues, with direct reporting to the Deputy Secretary of Defense and Secretary of Defense.[97] The Director was tasked with the development and implementation of an operational energy strategy no later than 180 days after confirmation.[98] The law required the strategy be supported by key metrics, including energy efficiency Key Performance Parameters (KPP).[99] Additionally, and perhaps most importantly, the legislation directed DOD to consider fuel logistics support requirements in its program planning and acquisition processes.[100] It then legally defined the fully burdened cost of fuel concept as "the commodity price for fuel plus the total cost of all personnel and assets required to move and, when necessary, protect the fuel from the point at which the fuel is received from the commercial supplier to the point of use."[101] Lastly, the DOD was required to submit an

[96] Duncan Hunter National Defense Authorization Act for Fiscal Year 2009, Pub. L. No. 110-417, 122 Stat. 4356 (at § 902).
[97] Id.
[98] Jerry Warner and Peter W. Singer, FUELING THE BALANCE: A DEFENSE ENERGY STRATEGY PRIMER, Foreign Policy Paper Series, Aug. 25, 2009.
[99] Duncan Hunter National Defense Authorization Act for Fiscal Year 2009, Pub. L. No. 110-417, 122 Stat. 4356 (at § 331).
[100] Id.
[101] Id.

annual report to Congress detailing progress made on the OE strategy, and to update its own OE strategy every five years.[102]

Section 3: The 2011 and 2016 OE Strategies

Before the publication of the first OE strategy, and in response to the increased Congressional focus, the DOD published its 2010 Quadrennial Defense Review[103] embracing the concept of military energy security for the first time. It defined energy security for the Department as "having assured access to reliable supplies of energy and the ability to protect and deliver sufficient energy to meet operational needs."[104] It further committed the DOD to implementing the energy efficiency KPPs and the fully burdened cost of fuel, as well as incorporating operational energy considerations into its force development, warfighting capabilities and acquisition processes.[105] It was under this supportive DOD framework that the OE office set to work and started developing the Departments inaugural strategy.

A. Establishment of OE Plans and Programs Office

Sharon Burke was appointed and confirmed in 2010 as the DOD's first-ever assistant secretary of defense for operational energy plans and programs. Her daunting mission was to preside over DOD's fundamental shift in its relationship with energy and create an energy strategy for all the services to follow that would improve capabilities,

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[102] Id.
[103] At that time, the Defense Review was a statutorily mandated document required every four years outlining DOD's strategy and future priorities. The 2014 QDR is the last published document as the requirement was cancelled by the 2017 NDAA and replaced with a National Military Strategy. *See* Joe Gould, *QDR Dead in 2017 Defense Bill,* DEFENSE NEWS, Apr. 25, 2016.
[104] DEP'T OF DEF., QUADRENNIAL DEFENSE REVIEW (2010), http://archive.defense.gov/qdr/QDR%20as%20of%2029JAN10%201600.pdf.
[105] Id.

cut costs and lower risk through better OE accounting, planning and management.[106] This challenge was made all the more difficult because up until that point no specific data had been kept. In her words, "You can't manage what you can't measure," so one of her first steps in creating the program was asking the research and engineering communities, both in the Office of the Secretary of Defense (OSD) and across the military departments to assess the way they were currently using OE in order to look for gaps. The mindset of the new office was to start small with targets aimed at improving its ability to measure energy.[107]

The other initial priority for the new office came direct from SECDEF Gates himself, which was to make it crystal clear that the first priority was existing operations and deployed forces.[108] Thus the first goal was to get rapid fueling solutions to current operations; and later to figure out how DOD best develops the future military force with those energy efficiency improvements in mind.[109] The other challenge was to overcome any cultural hesitancy to selling "green technology" to the military. To do this, the office consistently and repeatedly enforced the notion to military commanders that while energy was a cost item, it was also a unique capability in its own right—one that could provide more range and more endurance.[110] The thought was that once the military commander recognized the energy savings and relevance to the mission there would be little

[106] DEP'T OF DEF. DIRECTIVE 5134.15, ASSISTANT SECRETARY OF DEFENSE FOR OPERATIONAL ENERGY PLANS AND PROGRAMS (2011).
[107] Tim Ash and Andrew Erdmann, *Powering the US military: An interview with the Pentagon's Sharon Burke*, MCKINSEY & COMPANY, Apr. 2013.
[108] Id.
[109] Louis Peck, *New Mission for U.S. Military: Breaking its Dependence on Oil,* YALE ENVIRONMENT 360, Dec. 8, 2010.
[110] Tim Ash and Andrew Erdmann, *Powering the US military: An interview with the Pentagon's Sharon Burke*, MCKINSEY & COMPANY, Apr. 2013.

resistance.[111] Unfortunately, this proved to be a naïve but optimistic strategy, which never quite permeated the entrenched cultural reluctance to "go green."

B. 2011 OE Strategy and Implementation Plan

The first OE strategy was meant to set the direction for DOD. It was released in June 2011, followed up by an implementation plan with mid, near and long-term targets. It aligned itself with the goals outlined in the 2010 Quadrennial Defense Review—demand reduction, increased diversity and security of supply, and then, finally incorporating OE considerations into future planning.[112] To achieve these goals, the strategy outlined a threefold approach—demand, supply and future force planning.[113] The first prong was entitled "More Fight, Less Fuel: Reduce Demand for Energy in Military Operations." This prong addressed the growing military appetite for energy, dependent upon supply lines that were costly, vulnerable to disruption and a burden on warfighters.[114] The means for reducing demand and improving efficiency were both materiel and non-materiel according to the strategy.[115] The DOD components were to invest in new technologies and equipment but also in new practices and behaviors—again, a cultural shift in thinking. To achieve this reduced demand, the implementation plan laid out several targets aimed at measuring OE consumption by establishing

[111] Louis Peck, *New Mission for U.S. Military: Breaking its Dependence on Oil,* YALE ENVIRONMENT 360, Dec. 8, 2010. One example of mission relevant is "lightening the load" for logistics forces. In 2010, a Marine or soldier going on a three-day foot patrol in Afghanistan often carried 33 batteries, weighing up to 10 pounds, to power critical gear. The battery loads were projected to increase as radios and computers were added as necessary equipment. Improved energy performance could therefore lighten the load to help military effectiveness.
[112] Tim Ash and Andrew Erdmann, *Powering the US military: An interview with the Pentagon's Sharon Burke*, MCKINSEY & COMPANY, Apr. 2013.
[113] DEP'T OF DEF., OPERATIONAL ENERGY STRATEGY (2011).
[114] DEP'T OF DEF., OPERATIONAL ENERGY STRATEGY: IMPLEMENTATION PLAN (2012).
[115] DEP'T OF DEF., OPERATIONAL ENERGY STRATEGY (2011).

performance metrics and baselines "using all available data on actual energy consumption in support of military operations," and encouraging innovation.[116]

The second prong was called "More Options, Less Risk: Expand and Secure Energy Supplies for Military Operations."[117] The strategic goal was to diversify and secure military energy supplies.[118] The report noted that by the end of 2010, DLA-Energy[119] was moving 40 million gallons of fuel per month into Afghanistan alone.[120] Assuring lawmakers and DOD leaders that that commitment would continue was critical, however, the strategy also emphasized the importance of balancing that commitment with parallel efforts to develop and deploy alternative energy, with a focus on energy that could be generated or procured locally or regionally near deployments.[121] Maintaining this balance was also important to assure skeptics that military energy security would enhance and not sacrifice other operational capabilities. The target created for this prong was the promotion and development of a DOD alternative fuels policy as well as establishing a departmental-wide alternative fuels investment portfolio.[122]

The third prong was more forward, future focused entitled "More Capability, Less Cost: Build Energy Security into the Future Force."[123] DOD would have to consider energy security in its strategic planning and force development in order to provide energy

[116] DEP'T OF DEF., OPERATIONAL ENERGY STRATEGY: IMPLEMENTATION PLAN (2012).
[117] DEP'T OF DEF., OPERATIONAL ENERGY STRATEGY (2011).
[118] Id.
[119] The mission of the Defense Logistics Agency is to provide best value integrated logistics solutions to U.S. forces and interagency customers around the clock and around the world. It contributes to the DOD's OE objectives by developing and implementing commercial-grade petroleum and alternative (non-petroleum) fuels. *See* Office of the Assistant Secretary of Defense for Energy, Installations and Environment, *Fiscal Year 2019 Operational Energy Budget Certification Report* (2018).
[120] DEP'T OF DEF., OPERATIONAL ENERGY STRATEGY (2011).
[121] Id.
[122] Id.
[123] Id.

security and enhanced warfighting capability for U.S. forces well into the future.[124] Up until that time, energy was not generally incorporated into strategic planning. The strategy clearly explained: "This is not to say that fuel demand should be more important than lethality, survivability, or any other performance parameters that guide DOD choices about how to equip military forces."[125] Rather, the strategy set a light-handed tone of merely taking "energy into account in order to make informed decisions about the choices and the tradeoffs in equipping and employing forces."[126] The targets established in the implementation plan for this prong directed DOD to integrate OE considerations into the full range of planning and force development by incorporating energy security considerations into requirements and acquisition.[127] Lastly, the 2011 OE strategy also created the Defense Operational Energy Board to serve as the primary body to charter and receive work related to the Implementation Plan and oversee progress on implementation of the strategy.[128]

C. DOD Energy Policy

In 2014, two notable things happened which changed the face of the OE program office and forced a reassessment of the foundational 2011 policy. First, the DOD released a long-overdue update to its 1991 "Energy Management Policy." The new guidance complemented the 2011 OE strategy by keeping energy security on the agenda. Specifically, it stated that DOD policy was "to enhance military capability, improve energy security and resilience, and mitigate costs in its use and management of

[124] Id.
[125] Id.
[126] Id.
[127] Id.
[128] Per Appendix D of the Implementation Plan, the Defense OE Board would be co-chaired by the Director of Operational Energy Plans and Programs and a designee from the Chairman's Joint Chief of Staff. Membership includes senior-level representatives from across the DOD, including the military departments.

energy."[129] It pledged action in six different areas: (a) improve the energy performance of weapons systems, platforms, equipment and products, and their modifications; (b) diversify and expand energy supplies and sources, including renewable and alternative fuels; (c) ensure that energy analyses were included in DOD requirements, acquisition, planning and budgeting; (d) manage energy-related risks to operations, training and testing; (e) develop and acquire technologies that meet DOD energy needs and (f) educate and train personnel in valuing energy as a mission essential resource.[130] Additionally, the policy also captured the merger of the Assistant Secretary of Defense for Operational Energy Plans and Programs and the Deputy Under Secretary of Defense for Installations and Environment to create the Assistant Secretary of Defense for Energy, Installations and Environment. The ASD (EI&E) became the principle advisor to the Secretary of Defense for Acquisition, Technology, and Logistics[131] on matters relating to energy, installations, and environment and the principal advisor to the Secretary of Defense and the Deputy Secretary of Defense regarding operational energy plans and programs.

The second notable event in 2014 was the publication of the Quadrennial Defense Review, which announced the DOD's "repositioning" or rebalance to the Asia Pacific region in response to new centers of power—i.e. China's rising regional influence and expansionist foreign policy.[132] To address this shift, the Quadrennial Defense Review directed the military services to prepare for an array of new security challenges in the Asia Pacific region and adjust its thinking regarding capabilities and capacity

[129] DEP'T OF DEF. DIRECTIVE 4180.01, DOD ENERGY POLICY, (2014) (last updated Aug. 31, 2018).
[130] Id.
[131] This office was redesignated on July 13, 2018 in a Deputy Secretary of Defense Memorandum to the Under Secretary of Defense for Acquisition and Sustainment.
[132] DEP'T OF DEF., QUADRENNIAL DEFENSE REVIEW (2014).

accordingly.[133] Thus, the ASD (EI&E) office released the 2016 strategy within this context.

D. 2016 OE Strategy

The revised OE strategy provided assurances that the provision of energy to the warfighter would remain vital, but that the evolving operational environment (i.e. pivot to Asia Pacific) and the lessons learned from the previous four years necessitated a revised approach.[134] Notably, the report contained an honest assessment of its successes to date but also discussed areas for improvement. First, the strategy spoke to its improved analytical capability. Relative to 2011, it stated that the DOD better understood the implications of energy use in its systems, operational plans, and concepts of operation, however, a significant barrier to improving tactics, techniques and procedures was the limited understanding of the Department's use of energy and the operational implications of that energy use on the warfighter.[135] For example, while the DOD's understanding of its OE consumption had improved significantly since 2012, its understanding of energy use by ground forces had lagged.[136]

Second, the DOD had made good progress in diversifying its energy supplies to reduce risk by pursuing renewable energy opportunities at contingency bases and conducting testing and certification of fuels and platforms to prepare for bulk purchases

[133] DEP'T OF DEF., QUADRENNIAL DEFENSE REVIEW (2014).
[134] DEP'T OF DEF., OPERATIONAL ENERGY STRATEGY (2016).
[135] Specifically, the Department had gained substantial experience using Energy Supportability Analyses (ESAs) to inform the Energy Key Performance Parameter (eKPP). Defined in the 2018 Manual for the Operations of the Joint Capabilities Integration and Development System (JCIDS), a KPP are key system capabilities that must be met in order for a system to meet its operational goal. Each KPP is supported by operational analysis that takes into account technology maturity, fiscal constraints, and schedule before determining threshold and objective values. See AcqNotes (http://acqnotes.com/acqnote/acquisitions/key-perfrormance-parameter) last visited Mar 5, 2019.
[136] DEP'T OF DEF., OPERATIONAL ENERGY STRATEGY (2016).

of cost competitive, drop-in[137] alternative fuels for operational use.[138] This was reflected in two DOD policies adopted in 2012 and 2015 regarding alternative fuel investments.[139] Though a positive step, this initiative was nascent and the use and experimentation with alternative fuels by the military departments was not widespread.[140] Moving forward, the report noted the "tyranny of distance" that would challenge the projection of power into the Asia Pacific region with increased reliance upon naval fleets and aviation, which would require more fuel than the ground-oriented operations in the Central Command theater.[141] For example, intra-theater lift in Afghanistan requires a fraction of the fuel that would be required for intra-theater lift in the Pacific.[142]

Another recognized area for focused improvement was the next generation of weapons platforms and concepts of operation, which often required more energy than their predecessors.[143] Thus, the cultural shift that the 2011 OE strategy had set out to create, of having an energy conscious mindset, had not yet infiltrated acquisitions and planning. The strategy specifically commented on anti-access/area-denial[144] weapons

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[137] See KATHERINE BLAKELY, CONG. RESEARCH SERV., R42859, DOD ALTERNATIVE FUELS: POLICY, INITIATIVES, AND LEGISLATIVE ACTIVITY, (2012). ("Drop-In" means requiring no modifications for existing engines).
[138] DEP'T OF DEF., OPERATIONAL ENERGY STRATEGY (2016).
[139] *See* Memorandum "DOD Alternative Fuels Policy for Operational Platforms," Jul. 5, 2012 and DEP'T OF DEF. INSTR. 4140.25, *DoD Management Policy for Energy Commodities and Related Services* (2015) (last updated Aug. 31, 2018).
[140] DEP'T OF DEF., OPERATIONAL ENERGY STRATEGY (2016).
[141] RICHARD J. KENDIG, ASHLEY D. SEATON, ROBERT J. RODGERS, EVOLUTION OF THE OPERATIONAL ENERGY STRATEGY AND ITS CONSIDERATION IN THE DEFENSE ACQUISITION PROCESS (Sept. 2016)(unpublished MA joint thesis, Naval Postgraduate School).
[142] "A cargo plane flying from Bagram to Kandahar burns around 3,000 gallons of fuel, but that same aircraft will burn around 11,500 gallons of fuel flying from Guam to Seoul and over 16,000 gallons flying from Guam to Singapore." *See Energy Security and Research, Before the Subcommittee on Defense Senate Appropriations Committee,* 113th Cong. (2014)(statement of Tom Morehouse, Acting Assistant Secretary of Defense for Operational Energy Plans and Programs.
[143] DEP'T OF DEF., OPERATIONAL ENERGY STRATEGY (2016).
[144] *See* U.S. GOV'T ACCOUNTABILITY OFFICE, GAO 15-674, DEFENSE ENERGY: OBSERVATIONS ON DOD'S INVESTMENTS IN ALTERNATIVE FUELS (2015). (Anti-access refers to the actions and capabilities designed to prevent an opposing force from entering an operational area and area denial refers to the actions and capabilities designed to limit an opposing force's freedom of action within an operational area).

(A2/AD) like mines, ballistic and cruise missiles, and advanced air defenses, which threaten the assured delivery of energy across air, land and sea domains.[145] While these weapons are more capable in terms of speed, survivability, stealth, payload, and maneuverability, they often require more energy—highlighting the persistent tension between energy efficiency initiatives at the cost of increased capability.

With these challenges in mind and the refocus on another, more distant theater of operations, the 2016 OE strategy focused on three objectives. First, increase future warfighting capability by including energy throughout future force development.[146] Similar to prong three from the 2011 strategy, the goal was to continue investments in innovation but do a better job at institutionalizing energy supportability analyses in capability development, prior to developing the Energy Key Performance Parameters.[147] The second objective was to identify and reduce logistics and operational risks from OE vulnerabilities and third was to enhance mission effectiveness of the current force through updated equipment and improvements in training, exercises, and operations.[148] In summary, the new strategy focused on upgrades to DOD's current equipment to improve energy use, while also improving its energy behavior. Ultimately, the 2016 strategy seemed less of a different approach, but rather a reaffirmation of the objectives established in 2011. Additionally, the revised strategy took some criticism for not including specific energy reduction targets[149], but the report deflected this criticism

[145] DEP'T OF DEF., OPERATIONAL ENERGY STRATEGY (2016).
[146] Id.
[147] Id.
[148] Id.
[149] Installation energy had targets. *See* The DOD Energy Blog, http://dodenergy.blogspot.com/

saying "operational requirements and needs of the Joint Force should define our objectives, not just reduction in energy use."[150]

Section 4: OE Today – Status, Progress, Continuing Challenges

As required by section 2925(b) of title 10, the DOD's Operational Energy office submits an annual report to Congress providing information on operational energy demands, progress in implementing the strategy, investments in alternative fuels and support to contingency operations.[151] The most recent annual report released in July 2018 provides data for the 2017 fiscal year. What is perhaps most illuminating is the historical data showing the Department's OE consumption since metrics were required to be recorded. The data starts from fiscal year 2012 and continues to the present with estimations for future fiscal years. The level of energy use has been steady since FY2013, and according to DOD "reflects relatively consistent operations tempo."[152] See Figure 1.1 (borrowed from the annual report).

Figure 1.1: DOD Operational Energy Demand by Service (million barrels)

	FY12	**FY13**	**FY14**	**FY15**	**FY16**	**FY17**	**FY18e**	**FY19e**
Army	16.1	12.7	10.1	7.3	7.1	7.6	8.0	8.0
Navy	31.5	28.4	28.2	28.5	28.5	28.4	26.6	26.3
Air Force	55.7	47.8	48.6	52.0	49.6	49.0	50.5	50.0
Marine Corps	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1
Other DOD	0.4	0.7	0.3	0.5	0.4	0.3	1.4	1.4
Total Demand	**103.9**	**89.8**	**87.4**	**88.6**	**85.7**	**85.5**	**87.0**	**86.2**
Expenditures, $ Billions	**$16.3**	**$14.8**	**$14.0**	**$14.1**	**$8.7**	**$8.2**	**$9.0**	**$9.0**

Overall, the DOD's OE demand peaked in FY 2007, and then declined by 30 percent from that peak in FY 2014. Many of these changes in energy are attributed to operational

[150] DEP'T OF DEF., OPERATIONAL ENERGY STRATEGY (2016).
[151] OFFICE OF THE UNDER SECRETARY OF DEFENSE FOR ACQUISITION AND SUSTAINMENT, *Fiscal Year 2017 Operational Energy Annual Report* (2018).
[152] Id.

tempo in U.S. Central Command, responsible for overseeing the operations in the Middle East.[153]

Today, the energy picture looks much different for the U.S. now than it did a decade ago. The so-called shale revolution—the surge since 2010 in U.S. production of unconventional shale oil and gas through hydraulic fracturing (fracking) and horizontal drilling of shale rock—has turned the U.S. into a leading oil and natural gas producer, making it a bona fide player in global fossil fuel markets.[154] According to the U.S. Energy Information Administration, in 2017, U.S. net imports of petroleum from foreign countries were equal to about 19 percent of U.S. petroleum consumption.[155] This marked the lowest percentage since 1967.[156] In late November 2018, the U.S. actually exported more crude oil and petroleum products than it imported for the first time since 1991.[157]

While overall this reduction in foreign oil imports and U.S. production of oil and gas is a positive sign that may bolster the nation's energy security, it does little to reduce the DOD's operational energy footprint.[158] The reason being is that operational forces do not ship fuel from the U.S. into theater but buy it from sources near theater as a way to reduce transportation costs.[159] Thus, DOD operations are entirely dependent on the commercial global petroleum market for its supplies; and this will continue to impose

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[153] DEP'T OF DEF., OPERATIONAL ENERGY STRATEGY (2016).
[154] *See* MILITARY ADVISORY BD., CTR. FOR NAVAL ANALYSES, ADVANCED ENERGY AND U.S. NATIONAL SECURITY (2017), https://www.cna.org/CNA_files/PDF/IRM-2017-U-015512.pdf.
[155] *How much oil consumed by the United States comes from foreign countries?,* U.S. Energy Information Administration, https://www.eia.gov/tools/faqs/faq.php?id=32&t=6 (last viewed Feb. 20, 2019)
[156] Id.
[157] James Grant, *Renewables: Bridging the U.S. Energy Security Gap,* AMERICAN FOREIGN POLICY COUNCIL, DEFENSE DOSSIER, December 2018, Issue 23.
[158] DEP'T OF DEF., OPERATIONAL ENERGY STRATEGY (2016).
[159] WILLIAM M. SOLIS, U.S. GOV'T ACCOUNTABILITY OFFICE, GAO-08-523T, DEFENSE MANAGEMENT: OVERARCHING ORGANIZATION FRAMEWORK NEEDED TO GUIDE AND OVERSEE ENERGY REDUCTION EFFORTS FOR MILITARY OPERATIONS (2008).

risks.[160] The DOD purchased nearly 55 percent of its fuel outside the U.S. in FY 2017.[161] Given continued U.S. presence in the Middle East and the Navy's mission to protect the free flow of commerce (to include oil) globally, the strategic implications of fuel consumption are every bit as important despite greater output nationally. Moreover, the global supply will always be vulnerable to supply chain disruptions due to catastrophic natural disasters (i.e. Hurricane Katrina or Superstorm Sandy) or price shocks.[162]

A. Immediate Successes in OE

When the initial OE strategy was released in 2011 with the priority focused on deployed forces, there were some immediate successes, particularly aimed at efficiency improvements at contingency bases and FOBs in Iraq and Afghanistan. One of the first focus areas was "rapid fielding of equipment in theater," which meant efforts to streamline the deployment of energy efficient equipment to reduce in-theater fuel consumption.[163] The first target was efficiency improvements to environmental control units such as heating, ventilation and air conditioning.[164] One of the big energy consumers on the battlefield is shelters, typically tents.[165] The Army sprayed foam insulation on the outside of tents in both Iraq and Afghanistan to achieve about a fifty percent cut in their energy consumption.[166] Additionally, hybrid power generation methods were tested such as a combination of microgrids, solar generation, diesel

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[160] Id.
[161] Office of the Under Secretary of Defense for Acquisition and Sustainment, *Fiscal Year 2017 Operational Energy Annual Report*, Jul 2018.
[162] *See* MILITARY ADVISORY BD., CTR. FOR NAVAL ANALYSES, ADVANCED ENERGY AND U.S. NATIONAL SECURITY (2017), https://www.cna.org/CNA_files/PDF/IRM-2017-U-015512.pdf.
[163] MOSHE SCHWARTZ, KATHERINE BLAKELEY, RONALD O'ROURKE, CONG. RESEARCH SERV., R42558, DEPARTMENT OF DEFENSE ENERGY INITIATIVES: BACKGROUND AND ISSUES FOR CONGRESS (2012).
[164] Tim Ash and Andrew Erdmann, *Powering the US military: An interview with the Pentagon's Sharon Burke*, MCKINSEY & COMPANY, Apr. 2013.
[165] Louis Peck, *New Mission for U.S. Military: Breaking its Dependence on Oil,* YALE ENVIRONMENT 360, Dec. 8, 2010.
[166] Id.

generators and batteries.[167] Another example of energy innovation in theater was tactical biorefineries, which converted waste products in the field into biofuels for FOBs.[168]

Back in Washington, another successful component of the OE program was the creation of the Operational Energy Capability Improvement Fund (OECIF) which began in fiscal year 2012 with the goal of funding innovation that would improve the OE performance of U.S. forces while creating institutional change within the Department.[169] Its initial budget of 19.5 million focused on reducing the energy load of expeditionary outposts and transforming waste into energy.[170] In fiscal year 2019, its budget had increased to $40.9 million still focused on investing in OE science and technology initiatives.[171] Each year OECIF programs are selected from Service and Combatant Command proposals that align with the DOD's latest strategy and support a specific OECIF theme for that fiscal year.[172]

B. Service Specific Initiatives

Each Service branch also spelled out their own policies and initiatives in the inaugural OE era, many of which included an emphasis on changing their underlying culture. As the DOD's largest OE consumer, the Air Force aimed its energy initiatives at reducing its service's energy costs and at reducing the budgetary impact of volatility in

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[167] Tim Ash and Andrew Erdmann, *Powering the US military: An interview with the Pentagon's Sharon Burke*, MCKINSEY & COMPANY, Apr. 2013.
[168] Jerry Warner and Peter W. Singer, FUELING THE BALANCE: A DEFENSE ENERGY STRATEGY PRIMER, Foreign Policy Paper Series, Aug. 25, 2009.
[169] MOSHE SCHWARTZ, KATHERINE BLAKELEY, RONALD O'ROURKE, CONG. RESEARCH SERV., R42558, DEPARTMENT OF DEFENSE ENERGY INITIATIVES: BACKGROUND AND ISSUES FOR CONGRESS (2012).
[170] Id.
[171] DEP'T OF DEF., ASSISTANT SECRETARY OF DEFENSE FOR ENERGY, INSTALLATIONS, AND ENVIRONMENT, *Fiscal Year 2019 Operational Energy Budget Certification Report* (2018).
[172] Id. In FY2019, the theme was designed to Increase Future Warfighting Capability and aimed at the following programs—increasing the performance of unmanned systems, thermal and power management for high pulse power systems and wireless energy transmission in the far field.

fuel prices.[173] Specifically, it aimed to reduce its consumption of aviation fuel and to test and certify all its aircraft and systems on a 50:50 alternative fuel blend by a target date.[174] The Marine Corps initiated an expeditionary energy program investing in solar-hybrid stationary power systems, flexible, mobile solar panels and reducing the number and size of batteries necessary for the deployed Marine.[175] It laid out its Marine Expeditionary Energy Strategy and Implementation Plan in March 2011 declaring that the more efficient use of energy and water resources must be part of the warrior ethos.[176] Likewise, the Army also sought to change its "warrior ethos." It identified "Surety, Survivability, Supply, Sufficiency, and Sustainability" as core characteristics of its energy security strategy.[177] It also acknowledged the effects of climate change and global resource constraints as major forces of change.[178] As such, the Army said it could "no longer assume unimpeded access to the energy, water, land and other resources required to train, sustain and deploy" its forces; and felt compelled to foster a more resource-informed culture.[179]

The Navy set out to transform its energy use with two priorities in mind: energy security and energy independence. In 2009, then Secretary of the Navy Ray Mabus

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[173] MOSHE SCHWARTZ, KATHERINE BLAKELEY, RONALD O'ROURKE, CONG. RESEARCH SERV., R42558, DEPARTMENT OF DEFENSE ENERGY INITIATIVES: BACKGROUND AND ISSUES FOR CONGRESS (2012).
[174] Id.
[175] Leslie Hayward, *Sharon Burke: How DOD is Cutting Oil Consumption to Create a Better Military,* THE FUSE, Sept 14, 2015.
[176] Sharon E. Burke, Assistant Secretary of Defense for Operational Energy Plans and Program, *Powering the Armed Forces: Meeting the Military's Energy Challenges*, HOOVER INSTITUTION (2012).
[177] This means preventing loss of access to power and fuel sources (surety), ensuring resilience in energy systems (survivability), accessing alternative and renewable energy sources available on installations (supply), providing adequate power for critical missions (sufficiency), and promoting support for the Army's mission, its community and the environment (sustainability). *See* DEP'T OF THE ARMY, ENERGY SECURITY & SUSTAINABILITY (ES2) STRATEGY (2015).
[178] *See* DEP'T OF THE ARMY, ENERGY SECURITY & SUSTAINABILITY (ES2) STRATEGY (2015).
[179] OFFICE OF THE UNDER SECRETARY OF DEFENSE FOR ACQUISITION AND SUSTAINMENT, FISCAL YEAR 2017 OPERATIONAL ENERGY ANNUAL REPORT (2018).

issued five aggressive goals for naval energy reform.[180] Those goals included: increasing alternative energy use operationally and ashore by 2020; sailing the "Great Green Fleet" by demonstrating a "green" strike group powered by biofuels; reducing non-tactical petroleum use in the commercial fleet by 50 percent; and transforming its process of acquisition, whereby evaluation of energy factors would be mandatory when awarding contracts for systems and buildings.[181] Though progress was made on a number of these initiatives, many inside and outside the Department of the Navy considered the goals an overreach at the expense of readiness and capability. The fanfare that led to the aggressive energy goals was too far too fast, alienating many commanders that were told to operate more efficiently without clear instruction as to how.[182] This was one factor that led to the concern about more expensive energy efficient technology upgrades.

C. New Administration 2017

The arrival of a new Administration brought significant changes in leadership and Department priorities. For OE, these changes included a new Under Secretary of Defense for Acquisition, Technology and Logistics (USD(AT&L) and a new Assistant Secretary of Defense for Energy, Installations and the Environment (ASD(EI&E).[183] The new staff conducted a review of the 2016 OE strategy and confirmed that energy did indeed remain a fundamental enabler of military capability, and the ability of the U.S. to project and sustain power depended upon the assured delivery of this energy.[184] This was echoed in the Trump administration's National Defense Strategy, which articulated the

[180] Sharon E. Burke, Assistant Secretary of Defense for Operational Energy Plans and Program, *Powering the Armed Forces: Meeting the Military's Energy Challenges*, HOOVER INSTITUTION (2012).
[181] DEP'T OF THE NAVY, ENERGY, ENVIRONMENT AND CLIMATE CHANGE HOMEPAGE https://navysustainability.dodlive.mil/energy/ (last visited May 7, 2019).
[182] Interview with James Caley, Director for Operational Energy, Department of the Navy, (Mar. 22, 2019).
[183] OFFICE OF THE UNDER SECRETARY OF DEFENSE FOR ACQUISITION AND SUSTAINMENT, FISCAL YEAR 2017 OPERATIONAL ENERGY ANNUAL REPORT (2018).
[184] Id.

Administration's view of the threats and challenges facing the Nation. It stated that a great-power competition, namely Russia and China, had now re-emerged as the central challenge to U.S. security.[185] It outlined a security environment characterized by strategic competition and a "lethal and disruptive battlefield, combined across domains (air, land, sea, space, cyberspace), and conducted at increasing speed and reach."[186] Since these multi-domain risks challenge the assured delivery of energy to the joint forces, the OE office reaffirmed the warfighter need to reduce the "tether" of fuel, while still increasing the capability of forces on land, air and sea.[187]

D. Re-organization of the OE office

In summer 2018, internal reorganization of the Office of the Secretary of Defense, reshuffled the directorates previously listed as part of the Office of the Assistant Secretary of Defense for Energy, Installations and Environment. They were re-structured under the Office of the Assistant Secretary of Defense for Sustainment.[188] Under this new structure, Environment and Energy are two separate offices and operational energy falls under Energy. While still adhering to the 2016 OE strategy, the stated mission of the new office is to enhance military capability, readiness, and resilience for the warfighter, while mitigating risk and cost in the supply and use of energy in operations and training.[189] Toward that end, it identifies four primary lines of effort (which appear

[185] *Fiscal Year 2019 DOD Budget Request* Before the Senate Committee on Appropriations Subcommittee on Military Construction, Veterans Affairs, and Related Agencies, 115th Cong. (2018) (statement of Honorable Lucian Niemeyer, Assistant Secretary of Defense (Energy, Installations and Environment).
[186] DEP'T OF DEF., NATIONAL DEFENSE STRATEGY (2018).
[187] DEP'T OF DEF., OFFICE OF THE ASSISTANT SECRETARY OF DEFENSE FOR SUSTAINMENT, *Operational Energy*, https://www.acq.osd.mil/eie/OE/OE_index.html (last visited May 7, 2019).
[188] Id.
[189] Id.

redundant to the current OE strategy): (1) future force requirements; (2) wargaming, modeling, and simulation; (3) innovation and (4) warfighter support.[190]

The significance of this re-organization indicates a demotion in the importance of the OE program. The original criticism from outside organizations like DSB and GAO specifically targeted the lack of coherent leadership to manage energy demand across DOD leading to a lack of oversight and accountability.[191] Recall that the enabling legislation in 2008 created a Director position of OE policy and plans that would directly report to the Secretary of Defense. Now the position is multiple steps below what it previously was in the chain of command. Moreover, the biography of the current executive in the position focuses on installation energy only, leaving operational energy more as an afterthought.[192] Other signs that the OE momentum has waned since the change in Administration is that the Defense OE Board has not met in two years.[193]

E. Continuing Challenges for OE

The practical reality is that despite a drawdown of forces in the Middle East, missions will continue to persist across the full spectrum of military operations. The fuel demands for those activities—on land, at sea and in the air—will increase; and the fuel relied upon is still almost exclusively traditional sources of petroleum.[194] Worse still is that OE, for the most part, has not caught up with new acquisitions, and the latest weapons systems continue to require higher and higher energy demands, albeit with ever

[190] Id.
[191] REPORT OF THE DEFENSE SCIENCE BOARD, MORE CAPABLE WARFIGHTING THROUGH REDUCED FUEL BURDEN (2001).
[192] DEP'T OF DEF., OFFICE OF THE ASSISTANT SECRETARY OF DEFENSE FOR SUSTAINMENT, *Leadership,* https://www.acq.osd.mil/eie/Bios.html#IE (last visited May 7, 2019).
[193] Interview with James Caley, Director for Operational Energy, Department of the Navy, (Mar. 22, 2019).
[194] James Grant, *Renewables: Bridging the U.S. Energy Security Gap,* AMERICAN FOREIGN POLICY COUNCIL, DEFENSE DOSSIER, December 2018, Issue 23.

increasing combat capability.[195] This reliance on fuel continues to keep U.S. forces vulnerable threatening energy security. Particularly, asymmetric threats like anti-access and area denial (A2/AD) capabilities will continue to challenge the assured delivery of fuel to combat forces.[196] For example, a major concern as the focus shifts to power competition from Russia and China is that such a rival could block or constrain the movement of opposing forces into a given theater of operations, including through disruption of fuel supplies (energy denial).[197] Lessons of the last eighteen years of war have not been lost on potential adversaries, who are increasingly developing or acquiring capabilities that threaten U.S. ability to project and sustain this power.[198]

In addition to these challenges, OE faces another hurdle of trying to re-gain traction under very different circumstances than what existed a decade ago. The combination of a changed global energy landscape, a less supportive administration, and lagging institutional commitment has taken its toll. Today, the relative cost of energy is lower, contingency operations in Iraq and Afghanistan have decreased (particularly the fuel convoys to support those missions), and Administration priorities are much different. The Trump administration is less supportive of renewable energy and alternative fuels generally and its priorities are focused more on readiness goals to counter threats from Russia and China. Likewise, some in Congress have even been openly skeptical of energy efficiency targets calling them arbitrary goals, "environmentally based mandates

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[195] DEP'T OF DEF., OPERATIONAL ENERGY STRATEGY (2016).
[196] OFFICE OF THE UNDER SECRETARY OF DEFENSE FOR ACQUISITION AND SUSTAINMENT, FISCAL YEAR 2017 OPERATIONAL ENERGY ANNUAL REPORT (2018).
[197] Dorothy Robyn and Jeffrey Marqusee, *The Clean Energy Dividend: Military Investment in Energy Technology and What It Means for Civilian Energy Innovation,* REPORT BY INFORMATION TECHNOLOGY & INNOVATION FOUNDATION (2019).
[198] *Energy Security and Research, Before the Subcommittee on Defense Senate Appropriations Committee,* 113th Cong. (2014)(statement of Tom Morehouse, Acting Assistant Secretary of Defense for Operational Energy Plans and Programs.

[that] have squandered too much money on 'greening' the military."[199] These same critics often argue that these energy efficient goals are too costly and detract from capability, despite the fact that energy efficient contracts must be cost competitive and "diversifying fuel supplies, stabilizing fuel costs and reducing overall energy consumption translates into greater combat capability."[200]

Lastly, the OE program will continue to experience challenges in the face of a few other harsh realities. First, most of the Department's operations occur outside the U.S., and DOD will continue to buy energy overseas to simplify supply chains, limit costs and increase flexibility.[201] Second, global energy will continue to flow through a relatively small number of chokepoints.[202] Thus, the Middle East will remain a major source of oil for nations across the globe, requiring U.S. military attention. Given all of these challenges, one of the best ways forward is to more definitively link energy security with the momentum following the issue of climate change. The next section will detail the DOD's early recognition of the problem and trace its efforts to define the extent of the potential impacts on its operations.

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[199] *Ensuring Resiliency of Military Installations and Operations in Response to Climate Changes Before the House Armed Services Subcommittee on Readiness*, 116th Cong. (2019) (Opening Statement from Representative Doug Lamborn (R-CO), Ranking Member).

[200] *Energy Security and Research Before the Senate Subcommittee on Defense Appropriations*, 113th Cong. (2014) (statement of Hon. Dennis V. McGinn, Assistant Secretary of the Navy for Energy, Installations, and Environment).

[201] *Energy Security and Research Before the Senate Subcommittee on Defense Appropriations,* 113th Cong. (2014)(statement of Tom Morehouse, Acting Assistant Secretary of Defense for Operational Energy Plans and Programs).

[202] "Nearly a fifth of all oil and nearly 25 percent of globally traded liquefied natural gas transit the Strait of Hormuz." *Energy Security and Research, Before the Subcommittee on Defense Senate Appropriations Committee,* 113th Cong. (2014)(statement of Tom Morehouse, Acting Assistant Secretary of Defense for Operational Energy Plans and Programs).

Section 5: Climate Change Adaptation Roadmap and Nexus

While the term and conceptualization of "operational energy" is only a decade old, climate change as a looming concern has been recognized by the defense community for more than two decades, if not earlier. One of the earliest references was the May 2001 DSB report that focused on technologies to improve fuel efficiency for weapons platforms.[203] While revealing the DOD's high demand for operational energy, it also cited the issue of climate change emissions and their causal link to greenhouse gases, noting specifically that carbon dioxide released from the burning of fossil fuels represented 94 percent of DOD greenhouse gas emissions.[204] Acknowledging the DOD's emission contribution, the report called for improving the Department's energy efficiency and correcting its high fuel consumption patterns as a way to address these environmental security issues.[205] It was not until several years later, however, when the DOD classified climate change not just as an *environmental security* concern but also a national security challenge.

In October 2007, DOD released its first ever collective maritime strategy for the Navy, Marine Corps and Coast Guard called "A Cooperative Strategy for 21st Century Seapower."[206] It was the first U.S. military strategy document to explicitly refer to climate change as a national security concern, recognizing its devastating effects as an amplifier of social instability and regional crises.[207] Just two years later, the Navy would

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[203] *More Capable Warfighting Through Reduced Fuel Burden,* REPORT OF THE DEFENSE SCIENCE BOARD, May 2001.
[204] Id.
[205] Id.
[206] DEP'T OF THE NAVY, *A Cooperative Strategy for 21st Century Seapower (*2007) (https://www.navy.mil/local/maritime/150227-CS21R-Final.pdf)
[207] *Ensuring Resiliency of Military Installations and Operations in Response to Climate Changes Before the House of Representatives Armed Services Committee Subcommittee on Readiness*, 116th Cong. (2019)

launch its own task force dedicated to studying how climate change could affect maritime operations.[208] Around this same time, the Center for Naval Analysis (CNA) Military Advisory Board released two separate reports on national security—one highlighted the threat of climate change, while the other emphasized the risks and deleterious effects of American energy dependence on foreign oil.[209] The report on climate change said it constituted a threat multiplier to existing security risks in some of the most volatile regions of the world.[210] The report on U.S. energy dependence, and more narrowly the DOD's high energy consumption, called for a change noting that the "best approaches to energy, climate change and national security may be one and the same."[211] Lastly, both the 2010 and 2014 Quadrennial Defense Reviews dedicated substantial discussion to climate change and energy security noting their challenges were distinct but inextricably linked.[212] The reports stated that climate change would affect the DOD in two major ways—by shaping the operating environment, the roles and missions the organization would undertake, and by the adaptation and mitigation required to offset its impacts on DOD facilities and military capabilities.[213]

(statement of Sharon E. Burke, Senior Advisor and Director of the Resource Security Program New America).

[208] MEMORANDUM FOR DISTRIBUTION DEP'T OF THE NAVY VICE CHIEF OF NAVAL OPERATIONS, *Task Force Climate Change,* Oct. 30, 2009.

[209] *See generally* MILITARY ADVISORY BD., CTR. FOR NAVAL ANALYSES, POWERING AMERICA'S DEFENSE: ENERGY AND THE RISKS TO NATIONAL SECURITY (2009) and MILITARY ADVISORY BD., CTR. FOR NAVAL ANALYSES, NATIONAL SECURITY AND THE THREAT OF CLIMATE CHANGE (2007).

[210] MILITARY ADVISORY BD., CTR. FOR NAVAL ANALYSES, NATIONAL SECURITY AND THE THREAT OF CLIMATE CHANGE (2007). CNA later updated its initial report in 2014 based on additional scientific discoveries and scholarly literature adding that the risks identified were advancing noticeably faster than anticipated. *See* MILITARY ADVISORY BD., CTR. FOR NAVAL ANALYSES*,* NATIONAL SECURITY AND THE ACCELERATING RISKS OF CLIMATE CHANGE (2014).

[211] MILITARY ADVISORY BD., CTR. FOR NAVAL ANALYSES, POWERING AMERICA'S DEFENSE: ENERGY AND THE RISKS TO NATIONAL SECURITY (2009).

[212] DEP'T OF DEF., QUADRENNIAL DEFENSE REVIEW (2010).

[213] Id.

A. 2014 Climate Change Adaptation Roadmap

To spur further action from federal agencies at large, not just DOD, President Obama implemented two Executive Orders (EO) focused on sustainability, energy reduction and climate change. The first, EO 13514,[214] sought to establish "an integrated strategy towards sustainability" to make reduction of greenhouse gas emissions a priority as well as reduced energy consumption and expanding use of alternative and renewable energy sources.[215] As part of its mandate, it ordered each federal agency to create a Strategic Sustainability Performance Plan (SSPP) outlining greenhouse gas emission reduction targets and pollution prevention efforts, among many others.[216] In a DOD memo implementing the EO, the USD(AT&L) said commitment to this effort was critical and also consistent with the defense mission because "climate change, petroleum-based energy dependence, and national security" were interrelated global challenges.[217]

The Department's first SSPP was issued on August 26, 2010. The 99-page report stated that a strategic approach to climate change and energy was a high priority for DOD, such that its primary path to reaching its sustainability goals was to reduce the Department's reliance on fossil fuels through energy efficiency and renewable energy.[218] That said, a glaring omission was operational energy, which was exempt from the EO emission reduction targets, "since providing immediate support for the warfighter remained the Department's highest priority."[219] Nevertheless, the DOD said reducing the

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[214] Exec. Order No. 13,514, 74 Fed. Reg. 52, 117 (Oct. 8, 2009).
[215] Id.
[216] Id.
[217] MEMORANDUM FOR SECRETARIES OF MILITARY DEPARTMENTS BY THE UNDER SECRETARY OF DEFENSE FOR ACQUISITION, TECHNOLOGY AND LOGISTICS, *Leadership in Environment, Energy and Economic Performance,* Jan. 06, 2010. Available at https://www.denix.osd.mil/sustainability/revoked-eos/eo-13514/memoranda/leadership-in-environment-energy-and-economic-performance-memorandum/
[218] DEP'T OF DEF., STRATEGIC SUSTAINABILITY PERFORMANCE PLAN FY2010 (2010).
[219] Id.

energy demands of operational forces was a major focus of the Department's efforts to cut energy consumption, since overall, the military imperative of reducing operational energy demand would likely be a major contributor to the Department's greenhouse gas emissions reductions.[220]

The second Executive Order, EO 13653, *Preparing the United States for the Impacts of Climate Change*, directed federal agencies to undertake actions to enhance climate preparedness and resilience.[221] It was in response to this EO that the DOD published its 2014 Climate Change Adaptation Roadmap. In foreword comments provided by then Secretary of Defense Chuck Hagel, the Secretary said it was the DOD's responsibility to think ahead and plan for a wide range of contingencies in order to provide for U.S. security.[222] It focused its efforts in two areas: adaptation, or efforts to plan for the changes that are occurring or expected to occur; and mitigation, efforts that reduce greenhouse gas emissions.[223] It laid out three adaptation goals: (1) identify and assess the effects of climate change on the Department, (2) integrate climate change considerations across the Department and manage associated risks, and (3) collaborate with internal and external stakeholders on climate change challenges.[224] To help meet those goals, the Department concentrated its efforts in four areas: plans and operations, training and testing, built and natural infrastructure, and acquisition and supply chain. Also, as part of its assessment, the DOD pledged to complete a comprehensive assessment of all installations to assess the potential impacts of climate change on

[220] Id.
[221] Exec. Order No. 13,653, 78 Fed. Reg. 66,819 (Nov. 1, 2013).
[222] *See* DEP'T OF DEF., 2014 CLIMATE CHANGE ADAPTATION ROADMAP (2014) https://www.acq.osd.mil/eie/downloads/CCARprint_wForward_e.pdf.
[223] Id.
[224] Id.

missions and operational resiliency, and to develop and implement plans to adapt as required.[225] Accordingly, DOD issued Directive 4715.21, Climate Change Adaptation and Resilience, which assigned roles for implementing climate change adaptation and resilience at bases and in operations.[226]

B. Impacts of Climate Change on DOD and National Security

Like energy, DOD looks at climate through the lens of its mission—protecting national security. Changes in climate will shape the operating environment and the types of missions required.[227] From a DOD perspective, climate change presents two types of threats—direct and indirect.[228] The direct threats are those to military installations and infrastructure as a result of sea level rise and/or other extreme weather events.[229] This is the area that has received the most attention since the impacts from extreme weather events are already quite visible— California wildfires that closed Marine bases in September 2018; Hurricane Florence decimated Camp Lejeune and caused damage to Fort Bragg and military installations across North Carolina in September 2018;[230] Hurricane Michael's devastation of Tyndall Air Force Base in Florida, October 2018 which also damaged 17 F-22 stealth fighter jets; and severe flooding and damage to Offutt Air Force Base, home of U.S. Strategic Command, in Nebraska, in March 2019.[231]

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[225] DEP'T OF DEF., QUADRENNIAL DEFENSE REVIEW (2014).
[226] OFFICE OF THE UNDER SECRETARY OF DEFENSE FOR ACQUISITION AND SUSTAINMENT, *Climate Change Adaptation and Resilience,* DEP'T OF DEF. DIRECTIVE 4715.21 (2016) (last updated Aug. 31, 2018 to reflect internal re-organization).
[227] DEPARTMENT OF DEFENSE CLIMATE-RELATED RISK TO DOD INFRASTRUCTURE INITIAL VULNERABILITY ASSESSMENT SURVEY (SLVAS) REPORT, OFFICE OF THE UNDER SECRETARY OF DEFENSE FOR ACQUISITION, TECHNOLOGY, AND LOGISTICS (2018).
[228] Michelle Melton, *Climate Change and National Security, Part I: What is the Threat, When's It Coming, and How Bad will it be?* LAWFARE Blog, Nov. 19, 2018.
[229] Id.
[230] *The Need for Leadership to Combat Climate Change and Protect National Security Before the House of Representatives Committee on Oversight and Reform,* 116th Cong. (2019) (statement by Chuck Hagel, Former Secretary of Defense and U.S. Senator).
[231] Id.

In 2008 a National Intelligence Council report found that more than 30 U.S. military installations were already facing elevated levels of risk from rising sea levels.[232] By January of 2019, the number of priority installations that would feel potential climate related impacts (i.e. recurrent flooding, drought, desertification, wildfires, and thawing permafrost) had increased to 79.[233] Specifically, in a report to Congress, the DOD found that about two thirds of the 79 military installations surveyed in its review of climate vulnerabilities were already facing risks, including recurrent flooding at 15 bases, drought exposure at 43 bases and wildfire risk to 36 bases.[234]

The other type of threat from climate change are those indirect, or intangible, factors—the geopolitical and global economic effects such as mass migrations, resource scarcity and increased humanitarian disasters.[235] In this way, DOD has recognized that climate change acts as a catalyst for instability and conflict, often called a "threat multiplier."[236] These effects will "aggravate stressors abroad such as poverty, environmental degradation, political instability, and social tensions – conditions that can enable terrorist activity and other forms of violence."[237] The start of the Syrian civil war, for example, started because of a 10-year drought exacerbated by climate change.[238] Another example of climate change impacting geopolitical relations is in the changing Arctic region. Not only has the melting sea ice created a new operational environment,

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[232] UNITED STATES NATIONAL INTELLIGENCE COUNCIL, *National Intelligence Assessment on the National Security Implications of Global Climate Change to 2030* (2008).
[233] *Report on Effects of a Changing Climate to the Department of Defense,* OFFICE OF THE UNDER SECRETARY OF DEFENSE FOR ACQUISITION AND SUSTAINMENT (2019) as required by § 335 of the NDAA for FY 2018 (Public Law 115-91).
[234] Id.
[235] William J. Nuttall, Constantine Samaras, and Morgan Bazilian, *Energy and the Military: Convergence of Security, Economic, and Environmental Decision-Making,* Energy Policy Research Group Working Paper, University of Cambridge, Nov. 2017.
[236] DEP'T OF DEF., QUADRENNIAL DEFENSE REVIEW (2014).
[237] Id.
[238] Juliet Eilperin, Brady Dennis, Missy Ryan, *As White House questions climate change, U.S. military is planning for it,"* WASHINGTON POST, Apr. 8, 2019.

but the area is now rife with tension as Russia and China compete to expand their reach and influence.[239]

These direct and indirect threats from climate change impact national security in a myriad of ways. Perhaps the most serious impact is on military readiness. When a base or training ground is damaged or destroyed, this directly impacts military readiness, where readiness is measured by having sufficient numbers of personnel who are properly trained, equipped and organized to execute a mission.[240] For example, extreme temperatures and weather events cause military trainings to be delayed, moved or otherwise complicated.[241] Deploying the National Guard to respond to humanitarian-type assistance events both nationally and internationally is also straining military resources and readiness.[242] Thus, climate change impacts the physical environment in which U.S. military forces will operate; it poses increasing risks to DOD's infrastructure; and makes already unstable situations worse. With regard to the latter, these situations in particular must be addressed quickly otherwise more opportunistic countries could move in to exploit the instability to their advantage, and quite often to the detriment of U.S. interests.[243]

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[239] Rachel Fleishman and Sherri Goodman, *Climate Change and the U.S. Military,* AMERICAN FOREIGN POLICY COUNCIL, DEFENSE DOSSIER, December 2018, Issue 23.
[240] MILITARY ADVISORY BD., CTR. FOR NAVAL ANALYSES, NATIONAL SECURITY AND THE ACCELERATING RISKS OF CLIMATE CHANGE 21 (2014).
[241] *How Climate Change Threatens U.S. National Security Before the House of Representatives Committee on Foreign Affairs,* 116th Cong. (2019) (testimony of Sherri Goodman, Senior Fellow, Woodrow Wilson Center).
[242] Id.
[243] *Ensuring Resiliency of Military Installations and Operations in Response to Climate Changes Before the House of Representatives Armed Services Committee Subcommittee on Readiness,* 116th Cong. (2019) (statement of Rear Admiral David W. Titley, USN (Ret.), Professor and Director, Center for Solutions to Weather and Climate Risk, The Pennsylvania State University).

C. The Nexus of Climate Change and Energy Security

Energy security and climate security are two sides of the same coin. Heavy reliance on fossil fuels creates economic and security vulnerabilities and burning them spurs climate change.[244] Both of these factors come with associated costs. Since climate change acts as a threat multiplier it is sure to generate many more natural disasters, forcing the U.S. military to make ever more difficult strategic decisions about where, for what purposes, and with what tradeoffs U.S. military assets will be deployed.[245] Increased missions for military assets means more operational energy is required. Similarly, energy limitations also constrain the military's ability to project power since a FOB lasts only as long as its energy supply.[246]

Though this inter-relationship is clear, linking the two issues will not be easy nor come without considerable debate and political stamina. Congress and the DOD often make a distinction between energy and climate change as well as between fixed bases located within the U.S. and operational platforms.[247] This likely occurs for three reasons. First, for those remaining skeptics of climate change, it is easier (politically) to address the issue when there are tangible impacts in the present—i.e. the wildlfires, hurricanes and floods already wreaking havoc on DOD infrastructure. Congress, in particular, has been very active; holding hearings and requiring DOD to submit reports on the resiliency

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[244] Remarks by Daniel Chiu, Deputy Assistant Secretary of Defense for Strategy, Office of the Secretary of Defense, before Woodrow Wilson Project panel *The Energy and Climate Nexus: Challenges and Opportunities for Transatlantic Security*, Jun. 6, 2013.

[245] *Climate Change and Global Security: Challenges, Threats, and Global Opportunities Before the Senate Committee on Foreign Relations*, 111th Cong. (2009) (statement of Sharon Burke, Vice President for National Security, Center for a New American Security).

[246] *Energy Security and Research Before the Subcommittee on Defense Senate Appropriations Committee,* 113th Cong. (2014) (statement of Senator Durbin).

[247] *Ensuring Resiliency of Military Installations and Operations in Response to Climate Changes Before the House of Representatives Armed Services Committee Subcommittee on Readiness,* 116th Cong. (2019) (statement of Sharon E. Burke, Senior Advisor and Director of the Resource Security Program New America).

of military installations and operations in the face of climate change.[248] Second, Congress and DOD often divorce the two issues for the same reason that the SSPP exempted operational energy from its emission reduction targets—that environmental limits, no matter how intrinsically good, will always be viewed as a constraint on military flexibility and a burden on the warfighter. [249] In a recent congressional hearing calling for more leadership on climate change, Representative Mark Green (R-TN) argued that the Defense Department had but one purpose—"to kill our enemies"—and that any effort to distract from that focus, by addressing the climate change issue, would lead to the future loss of American lives.[250] He proceeded to identify a long list of concerns about the readiness of U.S. troops and equipment, and concluded that Congress should "not use a single dollar of the DOD budget to address the climate change issue."[251] Third, climate change has become a politically charged, partisan issue. As such, the DOD often tries to remain apolitical and may consider climate security a political fight best avoided.[252]

It is clear that work remains to overcome the cultural resistance and institutional reluctance to embrace the nexus that underlies energy security and climate security. It is not necessarily the nexus that is in dispute, but the combined approach to reach mutually complementary solutions. Most everyone can agree that any action to address climate

[248] Section 335, National Defense Authorization Act Fiscal Year 2018. Also see Mar. 13, 2019 hearing *Ensuring Resiliency of Military Installations and Operations in Response to Climate Change*, and Apr. 2, 2019 hearing *How Climate Change Threatens National Security,* and Apr. 9, 2019 hearing *The Need for Leadership to Combat Climate Change and Protect National Security.*
[249] Id.
[250] Mark K. Matthews, *5 Quotable moments from 4 hours of climate bickering,* E&E NEWS, Apr. 10, 2019.
[251] Id.
[252] *Ensuring Resiliency of Military Installations and Operations in Response to Climate Changes Before the House of Representatives Armed Service Committee Subcommittee on Readiness,* 116th Cong. (2019) (statement of Sharon E. Burke, Senior Advisor and Director of the Resource Security Program New America).

change must also protect America's economy, environment and national security[253], but that is easier said than done, particularly in a divided Congress. However, there is a role for both energy and environmental considerations when it comes to operational equipment and activities. Regardless of the approach, the DOD must get ahead of both issues before climatic events overcome indecision forcing the military to deal with the consequences.[254] The ability to move forward on both energy security and climate change efforts will be difficult for a variety of a reasons, but particularly because the Trump administration has openly questioned climate science and vigorously supports the fossil fuel industry. The next section will examine the Trump administration's impacts on the DOD's OE and climate agenda, and whether the administration's efforts actually undermine these goals.

Section 6: Trump Administration Impacts

The policy and priority shifts from the Obama administration to the Trump White House could not have been more stark in terms of environmental regulation. The energy and environmental sectors, in particular, felt the impacts of the upheaval most since President Trump initially targeted environmental rules deemed overly burdensome to the fossil fuel industry, including major Obama-era policies aimed at fighting climate change.[255] For starters, beginning in 2017, the Trump administration revoked and replaced EO 13653, *Preparing the U.S. for the Impacts of Climate Change*, with EO

[253] *The Need for Leadership to Combat Climate Change and Protect National Security Before the House of Representatives Committee on Oversight and Reform,* 116th Cong. (2019) (testimony of Former Secretary of Defense and U.S. Senator Chuck Hagel).
[254] *Ensuring Resiliency of Military Installations and Operations in Response to Climate Changes Before the House of Representatives Armed Service Committee Subcommittee on Readiness,* 116th Cong. (2019) (statement of Sharon E. Burke, Senior Advisor and Director of the Resource Security Program New America).
[255] U.S. GOV'T ACCOUNTABILITY OFFICE, GAO-19-157SP, HIGH RISK SERIES: SUBSTANTIAL EFFORTS NEEDED TO ACHIEVE GREATER PROGRESS AT HIGH RISK AREAS (2019).

13783, *Promoting Energy Independence and Economic Growth*.[256] The new EO declared it was in the national interest to promote the "clean and safe development of our Nation's vast energy resources, while at the same time avoiding regulatory burdens that unnecessarily encumber energy production, constrain economic growth, and prevent job creation."[257] It did not address climate change, except to rescind the nation's existing Climate Action Plan and also rescind Council on Environmental Quality guidance directing agencies to consider climate change in their National Environmental Policy Act reviews for certain types of federal projects.[258]

Other major policy shifts came when President Trump announced that the U.S. would withdraw from the Paris Climate Agreement,[259] an ambitious global action plan to fight climate change, signed by the U.S. in 2015 along with nearly 200 other countries.[260] Though technically by the terms of the agreement, the U.S. cannot officially exit the treaty until November 2020, the optics alone were chilling.[261] As part of the withdrawal, President Trump immediately stopped payment on the additional 2 billion that had been promised under President Obama to finance the Green Climate Fund.[262] Lastly, and most telling is that the White House National Security Council has never acknowledged that climate change is a national security threat, contrary to the last four presidential

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[256] Exec. Order No. 13,783*,* 82 Fed. Reg. 16,093, (Mar. 28, 2017).
[257] Id.
[258] U.S. GOV'T ACCOUNTABILITY OFFICE, GAO-19-157SP, HIGH RISK SERIES: SUBSTANTIAL EFFORTS NEEDED TO ACHIEVE GREATER PROGRESS AT HIGH RISK AREAS (2019).
[259] Specifically, the agreement tries to halt global warming at 1.5 degrees Celsius above pre-industrial levels, and not to let it exceed 2 degree Celsius. *See* Bobby Magill, *Five Ways Global Warming Changed the World Since the Paris Accord,* BLOOMBERG LAW, Sept. 10, 2018.
[260] NRDC, *Paris Climate Agreement: Everything You Need to Know*, https://www.nrdc.org/stories/paris-climate-agreement-everything-you-need-know (last visited May 7, 2019).
[261] United Nations Climate Change, *On the Possibility to Withdraw from the Paris Agreement: A Short Overview,* Jun. 14, 2017 (available at: https://unfccc.int/news/on-the-possibility-to-withdraw-from-the-paris-agreement-a-short-overview).
[262] Matt McGrath, *Paris Climate Pullout: The worst is yet to come,* BBC NEWS, Jun. 1, 2018 (https://www.bbc.com/news/science-environment-44330709).

Administrations.[263] Quite the opposite, when introducing his first National Security Strategy in December 2017, President Trump argued that the true threat to national security was not climate change but environmental regulations that interfered with U.S. economic and energy dominance.[264]

As such, the White House is reportedly exploring the idea of creating its own climate panel, led by an adviser who rejects mainstream climate science, to challenge the scientific consensus that the burning of fossil fuels is the main driver of global warming and revaluate whether climate change poses risks to national security.[265] This received strong criticism from over 58 senior retired military and national security leaders in a letter submitted to the White House denouncing the idea. They argued that, "imposing a political test on reports issued by the science agencies, and forcing a blind spot onto the national security assessments that depend on them, will erode our national security."[266] Indeed, in testimony to the House Oversight and Reform committee, former Secretary of State John Kerry, a signatory to the letter, stated, "We have no time to waste debating alternative facts only to be forced to invest years more trying to reestablish trust in the real ones."[267]

The disparity between the Trump administration's perspective and the growing consensus around climate science globally, to include U.S. assessments is unsettling.

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[263] *The Need for Leadership to Combat Climate Change and Protect National Security Before the House of Representatives Committee on Oversight and Reform,* 116th Cong. (2019) (statement by former Secretary of State John Kerry).
[264] Jean Chemnick, *Trump drops climate threats from National Security Strategy,* CLIMATEWIRE, Dec. 19, 2017.
[265] Coral Davenport, *White House Climate Panel to Include a Climate Denialist*, NYTIMES, Feb. 20, 2019.
[266] *Letter to the President of the United States: 58 Senior Military and National Security Leaders Denounce NSC Climate Panel*, THE CENTER FOR CLIMATE AND SECURITY, Mar. 5, 2019. Available at: https://climateandsecurity.org/letter-to-the-president-of-the-united-states-nsc-climate-panel/
[267] *The Need for Leadership to Combat Climate Change and Protect National Security Before the House of Representatives Committee on Oversight and Reform,* 116th Cong. (2019) (statement by former Secretary of State John Kerry).

According to a former Trump administration official, the issue is not climate change specifically but energy access.[268] The Trump administration would prefer to see science divorced from energy policy to ensure universal access to all energy types, particularly fossil fuels.[269] Publicly, administration officials may acknowledge that climate change has an impact on national security, but the issue is where it ranks on the list of threats and Administration priorities. According to EPA's Administrator Andrew Wheeler, people should be less worried about climate change, than say access to clean drinking water, since its impacts are 50-75 years away.[270] Yet this contradicts a major report issued by the United Nations Intergovernmental Panel on Climate Change (IPCC), which predicted atmospheric warming will reach 2.7 degrees Fahrenheit around 2040.[271] This same report warned that countries had about 12 years to stop greenhouse gas contributions or face irreversible effects of climate change.[272] The White House dismissed the report as depicting a worst-case scenario.[273]

A. Climate Change Consensus and Momentum

In addition to the October 2018 IPCC report, there have been a number of reports and vocal activists calling for increased attention to the issue of climate change and global warming. In November 2018, the Fourth National Climate Assessment (NCA) was issued by the U.S., a report that is required by law every four years.[274] Thirteen

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[268] Comments by Dave Banks, former Trump administration official, Atlantic Council event, *Climate Change & National Security: Protecting Integrity of Threat Assessments*, Mar. 25, 2019.
[269] Id.
[270] Zack Budryk, *EPA head says climate change threat 50-75 years out,* THE HILL, Mar. 20, 2019.
[271] IPCC Press Release, *Summary for Policymakers of IPCC Special Report on Global Warming of 1.5ºC approved by governments*, Oct. 8, 2018.
[272] Id.
[273] Zack Budryk, *EPA head says climate change threat 50-75 years out,* THE HILL, Mar. 20, 2019.
[274] The U.S. Global Change Research Program was established during President George H.W. Bush's administration in 1989 by a Presidential Initiative. Congress then mandated further action with the Global

federal agencies and 300 experts from around the country contributed to the report and painted a grim picture of projected climate change effects by the middle of the century.[275] The report warned that "Earth's climate is now changing faster than at any point in the history of modern civilization, primarily as a result of human activities."[276] Moreover, the report said that neither global efforts to reduce emissions nor regional resilience efforts currently approach the scale needed to avoid substantial damage over the coming decades.[277] This report was bolstered by two other key announcements. In a joint statement, NASA and NOAA revealed that 2018 was the fourth warmest year in a continuing warming trend since the 1880s.[278] NASA's Goddard Institute for Space Studies Director said: "This warming has been driven in large part by increased emissions into the atmosphere of carbon dioxide and other greenhouse gases caused by human activities."[279] The other major announcement was from a U.S. led team of climate scientists writing in the journal Nature Climate Change, which said the evidence for man-made global warming had reached a "gold standard" level of scientific certainty.[280]

With the science all but certain, action within the U.S. Congress and activism around the globe has also increased. The 116th U.S. Congress established a House Select Committee on the Climate Crisis in December 2018. Its mandate is "to investigate, study, make findings, and develop recommendations on policies, strategies, and

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Change Research Act of 1990. *See* Marshall Shepherd, *What Is The National Climate Assessment And Where Did It Come From?,* FORBES, Nov. 26, 2018.

[275] U.S. GLOBAL CHANGE RESEARCH PROGRAM, FOURTH NATIONAL CLIMATE ASSESSMENT (2018).

[276] Id.

[277] U.S. GOV'T ACCOUNTABILITY OFFICE, GAO-19-157SP, HIGH RISK SERIES: SUBSTANTIAL EFFORTS NEEDED TO ACHIEVE GREATER PROGRESS AT HIGH RISK AREAS (2019).

[278] *2018 fourth warmest year in continued warming trend, according to NASA, NOAA,* Feb. 6, 2019, (available at: https://climate.nasa.gov/news/2841/2018-fourth-warmest-year-in-continued-warming-trend-according-to-nasa-noaa/).

[279] Id.

[280] Alister Doyle*, Evidence for man-made global warming hits 'gold standard': scientists,* REUTERS, Feb. 25, 2019.

innovations to achieve substantial and permanent reductions in pollution and other activities that contribute to the climate crisis."[281] Additionally, the House Oversight and Reform Committee announced in April 2019 that it will launch its own series of hearings to identify opportunities for advancing concrete solutions to climate change.[282] U.S. Representative Alexandria Ocasio-Cortez introduced her so-called "Green New Deal" outlining an ambitious program of investments in clean-energy jobs and infrastructure, meant to address climate change and transform not just the energy sector, but the entire economy.[283] The speed and intensity of the media attention and activist energy embracing the plan have surprised many, including those involved.[284] Indeed, the Green New Deal "has thrust climate change into the national conversation...and created an intense and escalating bandwagon effect…which seems to have tapped into an enormous, untapped demand for climate ambition."[285]

This momentum shows no signs of stopping and even has a global youth following like the Sunrise Movement, which started in the U.S. in 2017 to stop climate change and create jobs in the process.[286] The other successful political movement is led by 16-year-old Greta Thunberg, a Swedish activist who started her Fridays for the Future protests outside the Swedish Parliament.[287] Frustrated by the lack of attention paid to the climate change threat, she initiated a school strike every Friday to protest. Unexpectedly,

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[281] Timothy Cama, *House Dems formalize climate committee plans without Green New Deal language*, THE HILL, Jan. 2, 2019.
[282] *The Need for Leadership to Combat Climate Change and Protect National Security Before the House of Representatives Oversight and Reform Committee,* 116th Cong. (2019) (opening statement Chairman Elijah E. Cummings).
[283] David Roberts, *The Green New Deal, Explained,* VOX, Mar. 30, 2019, https://www.vox.com/energy-and-environment/2018/12/21/18144138/green-new-deal-alexandria-ocasio-cortez
[284] Id.
[285] Id.
[286] The Sunrise Movement, https://www.sunrisemovement.org/ (last visited May 7, 2019)
[287] Kate Aronoff, *How Greta Thunberg's Lone Strike Against Climate Change Became a Global Movement*, ROLLING STONE, Mar. 5, 2019.

her actions inspired others around the globe becoming an international youth movement on a surprisingly large scale. Tens of thousands of students in nearly 300 towns and cities from Australia to Uganda to Japan joined her protest.[288]

This flurry of activism and global awareness is inspiring to many, though some critics have warned that "climate change fanaticism" is actually the larger threat.[289] While skeptics might downplay or even dismiss these events as short-lived, these issues are unlikely to fade from the national or international conversation any time soon given the high probability of increased natural disasters and melting sea ice creating global impacts. Regardless of whether the momentum is here to stay, the DOD should take advantage of the increased attention to double down on the linkage between energy security and climate change to ensure both programs continue unchallenged. The next section addresses whether the Trump administration's policies have any measurable effect on DOD's initiatives.

B. DOD policy in the era of Trump

In testimony before the House Armed Services subcommittee on readiness, at a hearing entitled "Ensuring Resiliency of Military Installations and Operations in Response to Climate Change," retired Rear Admiral David Titley explained that the Pentagon was between a rock and a hard place.[290] He said DOD officials by and large know what they need to do to address climate change, but felt constrained given White House dynamics where the White House does not want to hear about climate change or

[288] Id.
[289] Scott Waldman, *Trump Fed pick: No to climate science, yes to carbon tax,* E&E NEWS, Apr. 16, 2019.
[290] *Ensuring Resiliency of Military Installations and Operations in Response to Climate Changes Before the House of Representatives Armed Services Committee Subcommittee on Readiness,* 116th Cong. (2019) (statement of Rear Admiral David W. Titley, USN (Ret.), Professor and Director, Center for Solutions to Weather and Climate Risk, The Pennsylvania State University).

worse, openly questions its scientific basis.[291] As a result, some changes at DOD have been more apparent than others. For instance, the annual Strategic Sustainability Performance Plan required by (now revoked) EO 13514 has not been published since FY 2016, despite the fact that the sustainability steering committee established under the EO continues to exist and allegedly implements its goals, including the annual report.[292] Second, the Defense Operational Energy board has also not met in two years since the Trump Administration took over. These are just two examples of areas where the DOD has allowed current administration views to impact its mission, and there are likely more examples across the defense enterprise. Yet the DOD is not in a position where it can allow misguided White House policy to dictate its priorities, especially when it comes to preparation for climate change impacts.

Despite White House efforts to dispute climate change by attacking the science and weakening environmental protections,[293] the Defense Department has gone on record multiple times acknowledging the national security implications of climate change. It just recently reiterated that "the effects of a changing climate are a national security issue with potential impacts to DOD missions, operational plans and installations."[294] The Pentagon further said it would "continue to focus on ensuring it remains ready and able to adapt to a wide variety of threats—regardless of the source—to fulfill its mission to deter war and ensure the nation's security."[295] Thus, while it may not seek the spotlight, the

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[291] Margery A. Beck, Ellen Knickmeyer and Robert Burns, *Do the Floods suggest a national security threat from climate change,* ASSOCIATED PRESS, Mar. 22, 2019.
[292] DENIX, *EO 13834, See* https://www.denix.osd.mil/sustainability/eo-13834/
[293] *The Need for Leadership to Combat Climate Change and Protect National Security Before the House of Representatives Oversight and Reform Committee,* 116th Cong. (2019) (opening statement Chairman Elijah E. Cummings).
[294] Juliet Eilperin, Brady Dennis, Missy Ryan, *As White House questions climate change, U.S. military is planning for it,* WASHINGTON POST, Apr. 8, 2019.
[295] Id.

DOD has become the "unequivocal validator of climate science."[296] This explains why "noise" from the White House is relatively muted in the face of decades old defense and intelligence assessments confirming the climate change threat and continued Congressional requests for information related to DOD vulnerabilities and mitigation responses. Despite DOD's insulation from White House rhetoric, however, there are still obstacles that DOD must overcome internally in order to succeed in both areas of energy security and climate change. The following section outlines several recommendations that DOD should consider and adopt as it moves forward, particularly ahead of the next OE strategy anticipated in 2021.

C. Recommendations

Since the future of DOD's energy security is linked to climate change, identifying approaches to address both is critical.[297] The following recommendations encourage DOD to: (1) affirmatively link the triad of energy, climate and national security into the next OE 2021 strategy; (2) embrace DOD's unique role as a technological innovator and continue energy efficiency improvements; (3) create a senior Energy and Climate Security position to ensure that there is accountability and a unifying vision; and (4) rise above the partisan bickering and stay on message—notably, that addressing both energy security and climate security enhances military readiness and capability. The two are not mutually exclusive nor compromise the other.

[296] Sarah E. Light, *Valuing National Security: Climate Change, the Military, and Society,* 61 UCLA L. Rev. 1772 (2014).
[297] *National Security Implications of Global Climate Change*, CENTER FOR CLIMATE AND ENERGY SOLUTIONS (2009).

(1) OE 2021 Strategy should affirmatively connect the dots of Energy and Climate Security to National Security

Energy security and climate security are two sides of the same coin. The DOD should not move forward on either climate change or energy security without firmly establishing the inter-linking relationship between the two. Though this might be a political gamble given how partisan the issue of climate change has become, it is ultimately the prudent course of action for the long term. Additionally, the momentum and awareness surrounding climate change generally will bring renewed attention to critical issues like energy consumption, dependence on foreign oil, and carbon outputs. One way to better track DOD's progress toward sustainability is reissuing the Department's Strategic Sustainability Performance Plan outlining its greenhouse gas emission reduction targets and pollution prevent efforts, except this time, the DOD should strive to also include analysis of operational energy factors. Likewise, the next OE strategy should seek to promote energy solutions that improve DOD's energy security while also reflecting climate change realities. Messaging matters, so focusing on the benefits of energy conservation to military capability, and of climate policy to national security may make swallowing both less of a bitter pill for critics and also help drive behavioral changes in the climate change context.[298]

(2) Tune out White House rhetoric, Continue Research and Innovation of Energy Efficient Technologies

The DOD has a historical role as a technological innovator and incubator of ideas. It has played a major role in the development of at least three of the most important energy innovations of the last 75 years: the nuclear reactor, the gas turbine/jet engine, and

[298] Sarah E. Light, *Valuing National Security: Climate Change, the Military, and Society,* 61 UCLA L. Rev. 1772 (2014).

the solar photovoltaic (PV) cell.[299] It has also been the driver for many non-energy innovations as well, including radar, satellites, GPS, computers and the Internet.[300] As a result, DOD is uniquely situated to enhance its readiness and resiliency through effective energy policy and programs.[301] This year, the DOD will invest $1.6 billion in research, development, testing, and evaluation (RDT&E) that is directly related to energy.[302] Specifically, roughly half of the services' spending on operational energy initiatives, as defined and tracked by OSD, is going to RDT&E.[303] These ongoing and future efforts by DOD to increase the generation of renewable energy, and to institutionalize energy efficiency into all DOD operations, will improve the military's resiliency to vulnerabilities like climate change.[304] As such, the DOD should continue to understand its use of energy at all levels of operations, and know its carbon bootprint.[305]

The ultimate goal is to build a military force that uses energy as a strategic advantage rather than as a burden.[306] History has shown that with each significant revolution in technology, the nations that have adopted it most effectively have achieved profound military advantages.[307] As President Trump predicts the next major conflict

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[299] Dorothy Robyn and Jeffrey Marqusee, *The Clean Energy Dividend: Military Investment in Energy Technology and What it Means for Civilian Energy Innovation,* INFORMATION TECHNOLOGY AND INNOVATION FOUNDATION, Mar. 2019.
[300] Id.
[301] *Ensuring Resiliency of Military Installations and Operations in Response to Climate Changes Before the House of Representatives Armed Services Committee Subcommittee on Readiness,* 116th Cong. (2019) (statement of the Honorable John Garamendi, Chairman).
[302] Dorothy Robyn and Jeffrey Marqusee, *The Clean Energy Dividend: Military Investment in Energy Technology and What it Means for Civilian Energy Innovation,* INFORMATION TECHNOLOGY AND INNOVATION FOUNDATION, Mar. 2019.
[303] Id.
[304] DEP'T OF DEF., STRATEGIC SUSTAINABILITY PERFORMANCE PLAN (2010).
[305] MILITARY ADVISORY BD., CTR. FOR NAVAL ANALYSES, POWERING AMERICA'S DEFENSE: ENERGY AND THE RISKS TO NATIONAL SECURITY ix (2009).
[306] Sharon E. Burke, Assistant Secretary of Defense for Operational Energy Plans and Program, *Powering the Armed Forces: Meeting the Military's Energy Challenges*, HOOVER INSTITUTION (2012).
[307] MILITARY ADVISORY BD., CTR. FOR NAVAL ANALYSES, ADVANCED ENERGY AND U.S. NATIONAL SECURITY, 37 (2017).

will arise from major power competition with either Russia or China, it is imperative that the U.S. strive for a leaner, more efficient military. One scholar has even referred to this competition as a Green Arms Race, a movement focused on a more efficient fighting force, a reduction in the worldwide reliance on fossil fuels, investments in green energy technologies and the creation of a new, more stable world order of mutually assured sustenance.[308] Under this rubric, the once disparate approaches to address climate change, energy dependence, and national security become one and the same.

(3) Leadership, as it was intended by Congress

The recommendations from the 2001 and 2008 DSB reports are just as relevant now as they were then with regard to leadership. Recall that the Task Force had concluded that lack of leadership was a root cause of DOD's energy problems because there was no unifying vision and little accountability or oversight.[309] As a corrective measure Congress weighed in via the NDAA to establish a new executive-level position for Operational Energy Plans and Programs. This post, appointed by the President, was responsible for consolidated oversight for energy related issues, with direct reporting to the Secretary of Defense.[310] Over time, this post gradually merged with other offices and has now been subsumed under the Assistant Secretary of Defense for Sustainment energy office. This demotion in stature is significant. There must be sustained high-level attention for energy security issues and climate change. The position must be at a senior enough level so that that person can appropriately contextualize the risks as they pertain

[308] Siddhartha M. Velandy, *The Green Arms Race: Reorienting the Discussion on Climate Change, Energy Policy, and National Security,* 3 HARV. NATL SEC. J. 309, 2012.
[309] *More Fight, Less Fuel*, REPORT OF THE DEFENSE SCIENCE BOARD TASK FORCE ON DOD ENERGY STRATEGY (2008) http://www.acq.osd.mil/dsb/reports/2008-02-ESTF.pdf.
[310] Duncan Hunter National Defense Authorization Act for Fiscal Year 2009, Pub. L. No. 110-417, 122 Stat. 4356.

to other strategic priorities.[311] Establishing a senior Energy and Climate Security position would go a long way toward ensuring these issues were received and addressed at the highest levels. Incidentally, this was also a recommendation advanced by the Climate and Security Advisory Group to the incoming Trump administration back in 2016.[312]

The other benefit to sustained, high-level leadership is the ripple effect it would have throughout the institution, perhaps incentivizing leaders to look for more energy efficiencies in their business practices but also work to overcome any remaining cultural reluctance to "go green." The Pentagon itself is a barrier to these goals given climate change and other resource challenges are generally not seen as "real" security issues.[313] Moreover, these issues generally take a backseat to DOD's more immediate priorities of active combat operations, modernization needs, unfolding cyber and high tech wars and overall budget uncertainties.[314] Nevertheless, while cultural shifts take time, elevated leadership would go a long way toward achieving the desired end state.

(4) DOD should maintain Consistency of Message in Response to Partisan Fights

Climate change should be a matter of pragmatism, not politics said former Secretary of the Navy Chuck Hagel in his forward to the DOD's Climate Change Adaptation Roadmap, adding that "neither politics, ideology nor uncertainty regarding

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[311] *How Climate Change Threatens U.S. National Security Before the House of Representatives Committee on Foreign Affairs,* 116th Cong. (2019) (testimony of Sherri Goodman, Senior Fellow, Woodrow Wilson Center).
[312] *Briefing Book for a New Administration: Recommended Policies and Practices for Addressing the Security Risks of Climate Change,* THE CLIMATE AND SECURITY ADVISORY GROUP, Sept. 14, 2016.
[313] *Ensuring Resiliency of Military Installations and Operations in Response to Climate Changes Before the House of Representatives Armed Service Committee Subcommittee on Readiness,* 116th Cong. (2019) (statement of Sharon E. Burke, Senior Advisor and Director of the Resource Security Program New America).
[314] Id.

the threat should get in the way of sound planning."[315] Unfortunately, like many substantive issues in the current political environment, climate change has fallen victim to common political posturing. An issue that should be examined based on the soundness of its scientific findings has receded from the arena of informed public discourse and debate.[316] While the DOD cannot control how partisan the issue of climate change has become, it should not be forced to conceal its efforts to prepare for climate change related risks simply because the White House or some in Congress fail to appreciate the seriousness of the threat.

The DOD can and should continue to be apolitical and consistent in its evaluations of the threat. It should also continue to stress that leadership on both energy security and climate change is about military readiness and capability, factors that strike at the core of the defense mission, which should never be held hostage to partisan bickering. Moreover, the DOD holds an advantage in this fight in that numerous independent surveys have shown that the military continues to retain the full trust and confidence of the American people.[317] As a result, the DOD is uniquely able to work across multiple interest and partisan groups in pursuit of the wellbeing of the U.S.[318] The bottom line is that regardless of politics or changing presidential Administrations, the DOD has a "responsibility to prepare" given the unprecedented foresight of the threat and its mission to protect the nation.[319]

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[315] *See* DEP'T OF DEF., 2014 CLIMATE CHANGE ADAPTATION ROADMAP (2014), https://www.acq.osd.mil/eie/downloads/CCARprint_wForward_e.pdf.
[316] MILITARY ADVISORY BD., CTR. FOR NAVAL ANALYSES, NATIONAL SECURITY AND THE ACCELERATING RISKS OF CLIMATE CHANGE, (2014).
[317] Sharon E. Burke, Assistant Secretary of Defense for Operational Energy Plans and Program, *Powering the Armed Forces: Meeting the Military's Energy Challenges*, HOOVER INSTITUTION (2012).
[318] Id.
[319] *How Climate Change Threatens U.S. National Security Before the House of Representatives Committee on Foreign Affairs,* 116th Cong. (2019) (testimony of Sherri Goodman, Senior Fellow, Woodrow Wilson

Section 7: Conclusion

Over the last decade, the DOD has come a long way in understanding its energy consumption patterns and addressing the associated costs and vulnerabilities that flow from those choices. Though driven by Congress, the establishment of the OE office and recognition of the fully burdened cost of fuel was a major step forward for DOD. It ignited an energy conscious mindset across all Service branches and led to innovations that directly cut energy demand in forward locations. Yet despite these investments in time, money and policy pronouncements, multiple changes occurred which directly impacted the leadership and momentum on operational energy. The combination of a changed global energy landscape, a less supportive administration, and lagging institutional commitment took its toll.

While OE, and broader energy security goals, were sidelined by other DOD priorities, the Department's attention to climate change has been persistent. DOD has a long track record recognizing climate change as a national security threat and engaging its leaders to adapt and mitigate the direct and indirect threats to infrastructure and operations. While these efforts have been complicated by the Trump Administration's stance on climate change and fossil fuels, ultimately the DOD has successfully insulated itself from the rhetoric. No matter the current Administration's policies, efficient energy use and employing lower carbon fuel sources are essential both for operational security and to help avoid the national security impacts associated with climate change. The best

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Center). A "Responsibility to Prepare" Framework was introduced to the UN Security Council in late 2017 urging a comprehensive approach to the threat given its transnational and cross-sector nature. The purpose is to ensure that the U.S., its partners and allies, are able to withstand climatic stresses through a series of steps designed to enhance resilience.

approach to energy security, climate change and national security is truly one and the same.